ELECTRICAL WEST

Fixin' things is just as much fun as makin' them!
Frayed electric cords?
...NOT IN MY HOUSE!
MEET Mrs. Fixit...herself
I've sworn off "Wire Pulling"
Spring Cleaning?
"DON'T FORGET YOUR ELECTRICAL APPLIANCES!"
"Did you know that Electrical Appliances need cleaning, too!"
"and that includes Electrical Appliances!"
MARCH
Give house thorough cleaning
INSPECTOR OF ELECTRICAL APPLIANCES
You do this
WAR JOB

HELPING TO "MAKE THEM LAST"

Supplying low cost electricity is not the only wartime service the Southern California Edison Company renders its residential customers. Edison has consistently published information on the proper use and care of electrical appliances to help make them last until new ones are available.

Shown here are some of the most recent Edison appliance-care advertisements. They appeared in nearly 200 newspapers throughout Edison-served territory. Designed to aid the housewife during the war period, such advertisements also help to encourage the trend toward greater postwar use of electricity in the home.

SOUTHERN CALIFORNIA EDISON COMPANY LTD.

ELECTRICAL WEST (with which is consolidated The Journal of Electricity), July, 1944. Vol. 93, No 1. Published monthly by the McGraw-Hill Company of California, 68 Post Street, San Francisco, 4, Calif. Entered as second class matter at the post office at San Francisco under the Act of March 3, 1879. Additional entry as second class matter at the post office at Los Angeles. Printed in U. S. A. Subscription rate in U. S. and U. S. possessions, Canada and Pan-America, $2 per year; all other countries, $3 gold. Single copy 25c.
Copyright, 1944. McGraw-Hill Company of California.

The LOW-COST Cable that pays HIGH DIVIDENDS...

From a plain dollars-and-cents viewpoint, to electric light and power companies the most important cable advance in recent years is the development of ***gas-filled*** cable—introduced by G.E. in 1938.

This simply designed cable, which is not affected by profile and which is self-supervising, gives you the advantages of oil-filled cable at practically solid-cable cost.

A General Electric gas-filled-cable system needs no reservoirs, no special accessories in the manholes. Simple equipment ***at one end of the line*** is all that is required to keep a safe, even, gas pressure under all conditions of temperature and terrain. Furthermore, because of gas-filled cable's self-supervisory feature, you have automatic warning in case of a sheath rupture, and as a result, maintenance costs can be kept surprisingly low.

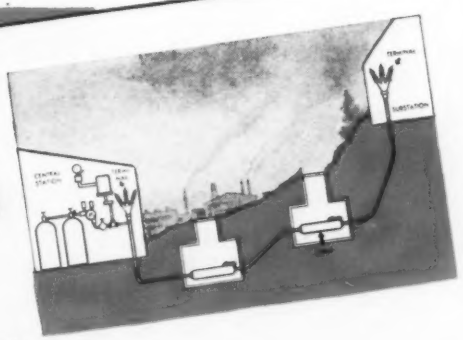
THE COST of G-E gas-filled cable is generally close to that of solid cable, within the solid-cable voltage range. For higher voltages, gas-filled cable is less expensive than any other type.

For detailed information on Type GF cable, write or call our local office. ***General Electric Co., Schenectady 5, N. Y.***

Gas-filled CABLE

BUY WAR BONDS

A simple, easily maintained system for 10- to 70-kv lines



Note in this diagram how standard nitrogen cylinders, at station or terminal, supply gas to lines through pressure relay and alarm equipment. Since there is sufficient volume of gas in the cable system to take care of daily load-temperature requirements, and because adjustments for changes in seasonal ambient temperatures are required only twice a year, manual control proves simple and satisfactory.

GENERAL ELECTRIC

ELECTRICAL WEST

VOL. 93 JULY, 1944 NO. 1

Electrical Industry Postwar Employment Opportunities 45

Central Valley Pictorial Review 49

Irrigation—Flood Control—Power 50

Hydraulic Features 52

Power House 54

Electrical 55

Substations—Transmission 56

Savings Through Planned Modernization ..... O. A. Gustafson 57

Has Salesmanship Gone Plumb to H——? 59

Policies for Future Merchandising ..... Frank Guasti 60

Revive Dealer Interest in Northwest 63

How Much to Earmark for the Wiring 67

Not So Fast There, Mr. O'Dwyer ..... Samuel Hibben 68

Phase Relation of Transformers ..... Roy Burnett 69

Departments

Books	10	Lighting and Wiring	67
New Products	18	Priorities	74
Bulletins	40	Rural	75
Electra	42	Editorials	76
Engineering	49	Associations	78
Sales	59	News	82

CHANGE OF ADDRESS

Circulation Manager,
Electrical West,
68 Post St.,
San Francisco 4, Calif.

Please change my address

From .....

To .....

Signed .....

People

O. A. Gustafson,

who tells about modernizing rotating equipment, p. 57, is assistant district engineer for General Electric's Pacific District, with headquarters in San Francisco.

Born in Minnesota, he received a B.S. in electrical engineering from the University of Idaho in 1923, then took the G-E test course at Schenectady. He was associated with the company in various departments at Schenectady; moved to Los Angeles in 1928 as central station department engineer. He has been in San Francisco since 1942. Gustafson lives in San Mateo, few miles from San Francisco; is associated with the AIEE, Engineers, Commonwealth and Electric clubs.

Preview

Menu for August

A full and a varied mental meal, with vitamins for everyone in any branch of the industry is scheduled for August. Everyone has heard that aircraft use electricity extensively. Richard Johnson will tell just how and why. Who isn't interested in new developments? The use of frequency modulation as applied to carrier systems on transmission lines will be described. Just before the inspectors meet to chew over the Code, another crack at old No. 14 is promised. Dealers in the Northwest were brought a preview of things to come. That preview will be extended to dealers and contractors everywhere in next month's pages. Then there will be summaries of what was discussed at association meetings for those who could not attend or to refresh the memories of those who did, news of significance to the industry, Electra's bright comments, new products, new bulletins, new books, new pictures.

Sangamo Capacitors Can Take It!

Climatic conditions, under which various communications equipments are operated, vary from the sub-zero temperatures of the northernmost climates to the tropical temperatures encountered at the equator. Conditions of humidity cover the extreme range; from the dry arid regions of the many deserts, to the almost 100% humidity in tropical and sub-tropical atolls.

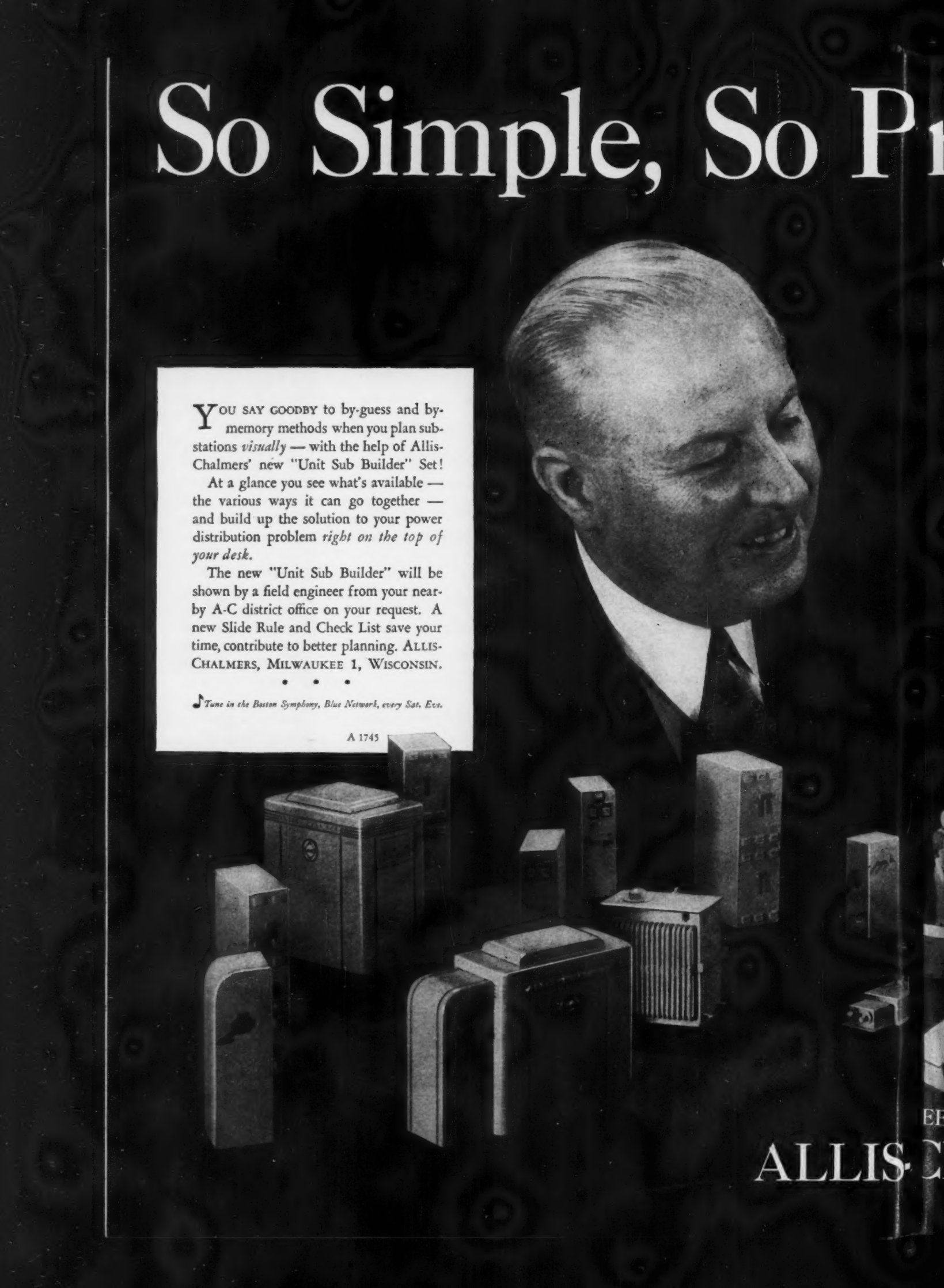
It has been the problem of Sangamo engineers to design and produce capacitors that perform faithfully under these varying conditions, and so assure vitally needed communications at all times.

The wide variety of capacitors illustrated insures the availability of the proper unit for almost any mica capacitor requirement.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

So Simple, So Pr



YOU SAY GOODBY to by-guess and by-memory methods when you plan substations *visually* — with the help of Allis-Chalmers' new "Unit Sub Builder" Set!

At a glance you see what's available — the various ways it can go together — and build up the solution to your power distribution problem *right on the top of your desk.*

The new "Unit Sub Builder" will be shown by a field engineer from your nearby A-C district office on your request. A new Slide Rule and Check List save your time, contribute to better planning. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

• • •

♪ *Tune in the Boston Symphony, Blue Network, every Sat. Eve.*

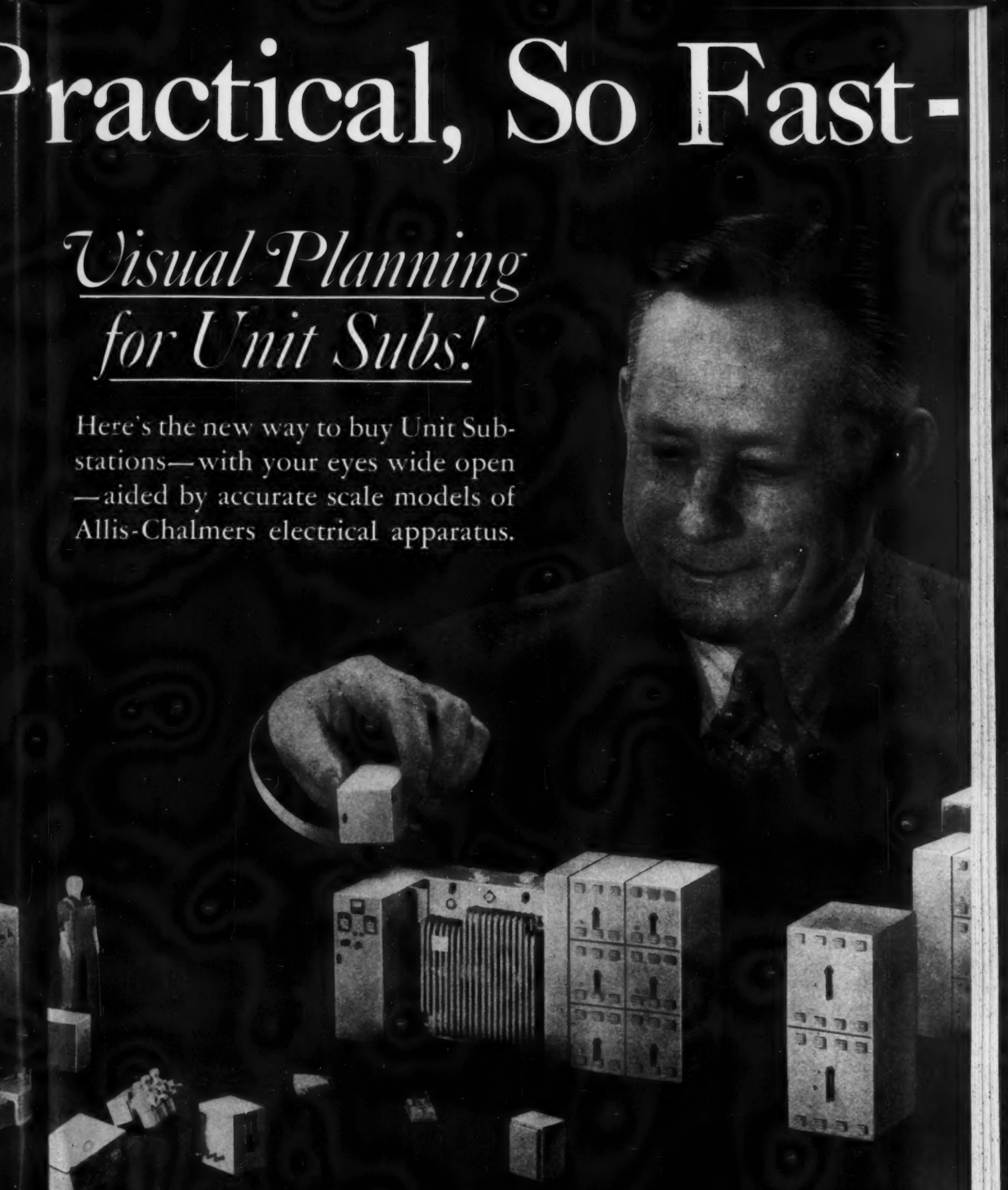
A 1745

ALLIS-C

Practical, So Fast-

Visual Planning for Unit Subs!

Here's the new way to buy Unit Substations—with your eyes wide open—aided by accurate scale models of Allis-Chalmers electrical apparatus.

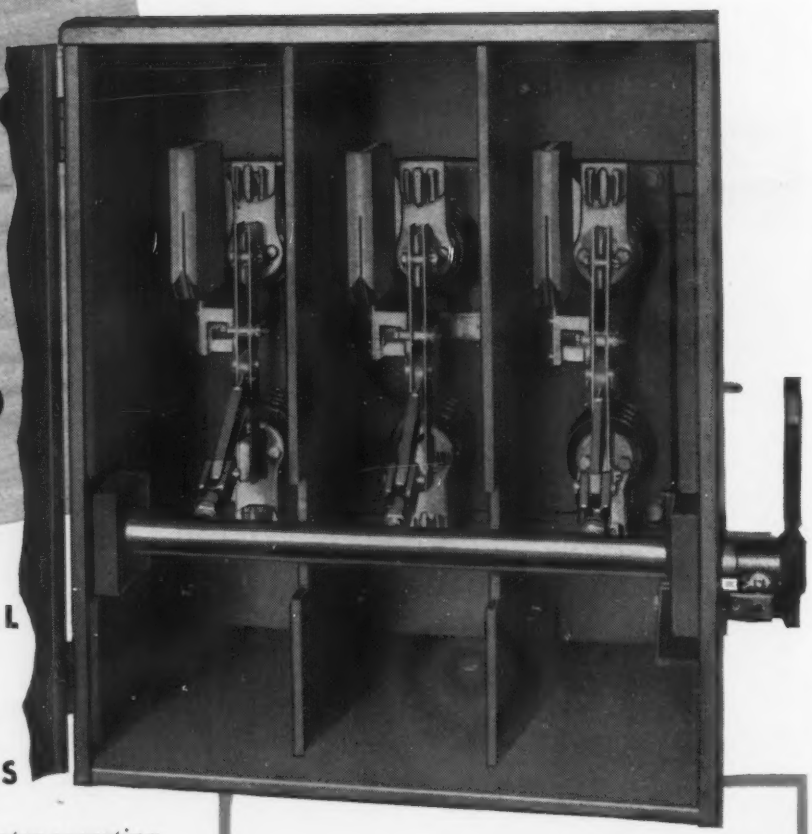


EE YOUR UNIT SUB IDEAS WORKED OUT WITH

S-CHALMERS *"Unit Sub Builder" Set*

O.K.

TO OPEN UNDER FULL LOAD



...WHEN YOU INSTALL WESTINGHOUSE LCB LOAD-BREAK DISCONNECT SWITCHES

LCB disconnects can give your system greater operating flexibility because they perform a double function: (1) they isolate the connected equipment, and (2) they can be opened at any time—*even under full load*.

The quick-break auxiliary blade, with its "De-ion" arc chamber, insures only "dead" switching on the main contacts. As a result, the switch can handle hundreds o operations without maintenance.

The LCB switch is designed for indoor installations and is group-operated. Suitable enclosures are available to meet all requirements. Combinations include mounting with BA power fuses for fused protection.

For complete information, call your Westinghouse office or write for B-3203, Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N.

J-60548

HOW IT WORKS

1. Closed . . . practically all current flows through main blade, small current through "quick-break" blade.

2. Main blade opens . . . all current momentarily flows through "quick-break" blade, which is held tightly.

3. "Quick-break" blade snaps open. Arc is stretched in "De-ion" chamber and instantly quenched.

RATING TABLE

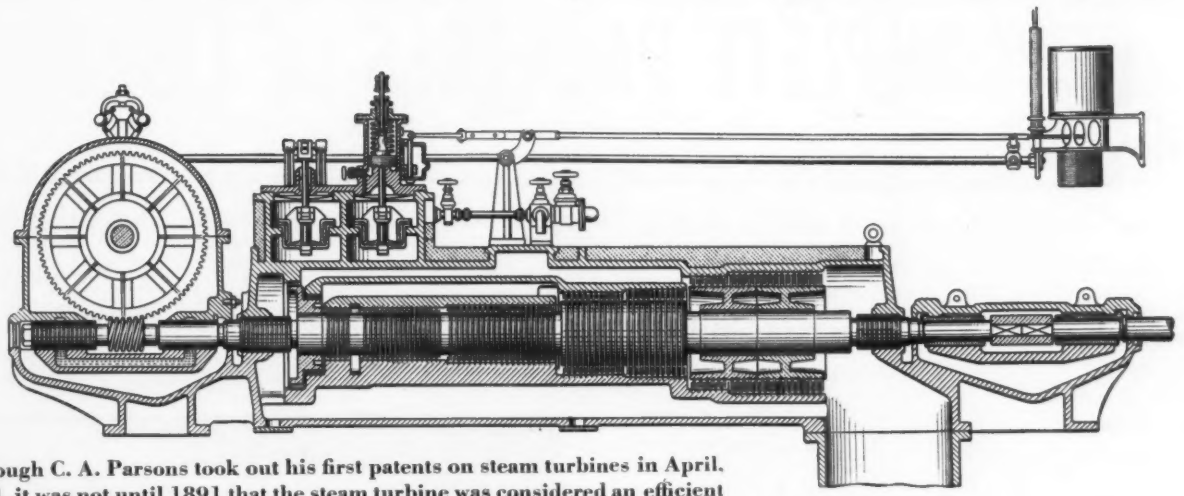
Switch Rating Continuous		System Voltage	Interrupting Rating Amperes
Amperes	Volts		
400	5000	2400 4160	400 400
200	7500	6900	200
100	15000	13800	100

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

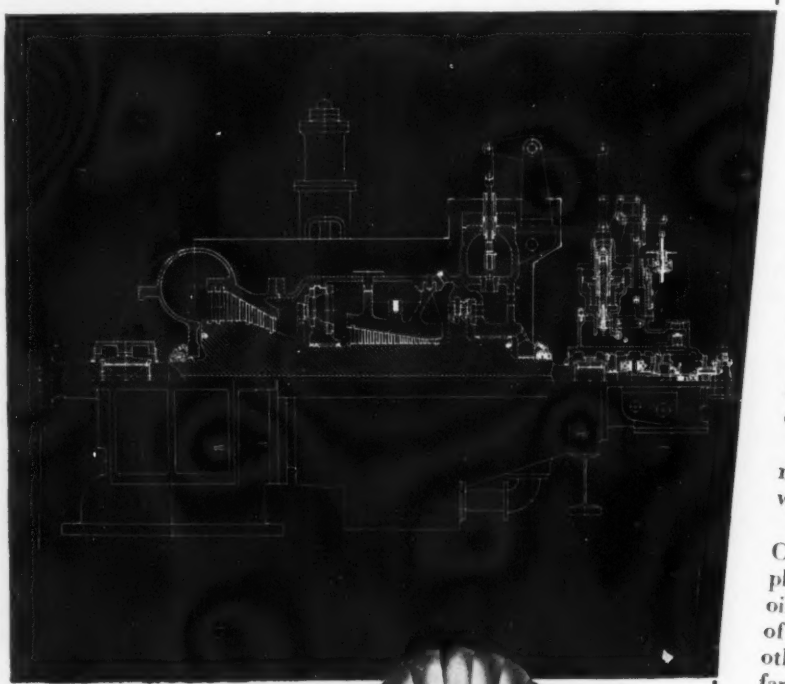
DISCONNECT SWITCHES

In 1891 a one-job oil was good enough...



Although C. A. Parsons took out his first patents on steam turbines in April, 1884, it was not until 1891 that the steam turbine was considered an efficient machine. Shown above is a cross-section of the general arrangement of an early Parsons' steam turbine that ran at relatively low pressures and temperatures. All that was required of a turbine oil then was that it lubricate.

The compactness and high operating efficiency of the modern steam turbine calls for a lubricant that must do more than just lubricate. A turbine oil today must also prevent rust, have superior oxidation stability.



BUT TODAY'S TURBINES NEED THIS 2-JOB TURBINE OIL!

1. That prevents rust

2. That has superior oxidation stability

THE MODERN, high-speed turbines of today with their closer clearances, high-steam temperatures and pressures, need more than a good lubricant. They need an oil that *prevents rust* as well as one that has superior *oxidation stability*. One that is suitable for use in governors as well as bearings. Shell Turbo Oil has both characteristics, because Shell Turbo Oil was designed from the start as a 100% turbine oil.

Because your turbines may be humming merrily along right now is no guarantee they will continue to do so.

Be sure your turbine oil is doing both jobs. Call in the Shell man. Let him show you samples of Shell Turbo Oil . . . the 2-job turbine oil that right now is performing in the turbines of our battleships, destroyers, cruisers and other units of our fleets . . . doing a job that is far tougher than any it will be required to do on land. In fact, Shell Turbo Oil was the first of its type to be approved as meeting rigid U. S. Navy specifications.

If you are not close to a Shell office, write Shell Oil Company, Inc., 50 West 50th Street, New York 20, New York, or 100 Bush Street, San Francisco 6, California.

SHELL

TURBO OIL

HOW STEEL *STRETCHES* THE SYLVANIA LINE OF "COMPLETE PACKAGES OF LIGHT"

Government release of steel for fluorescent fixture fabrication enables Sylvania to round out its line of "complete packages of light" to fit all industrial and commercial general lighting requirements.

Now there are SEVEN INDUSTRIAL UNITS

Continuous-Row Type

Back into the line come these outstanding Sylvania Fixtures with steel reflectors, designed primarily for continuous-row or end-to-end installations. They are made with the same high quality materials available in 1942.

Single (4-foot) channel top-housing

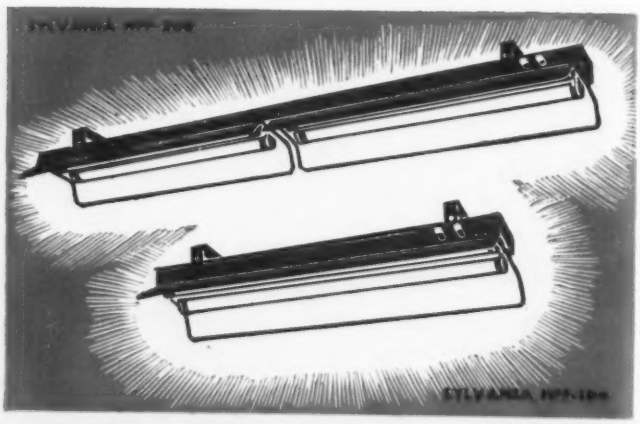
HFF-104—two 40-watt lamps, for continuous-row mounting
HFF-154—three 40-watt lamps, for continuous-row mounting

Double (8-foot) channel top-housing

(Continuous wire-way enclosure reduces cost of continuous-row installations)

HFF-208—four 40-watt lamps, for continuous-row mounting
HFF-308—six 40-watt lamps, for continuous-row mounting

All models come completely equipped with lamps, ballasts, and starters — pretested and ready for immediate installation.

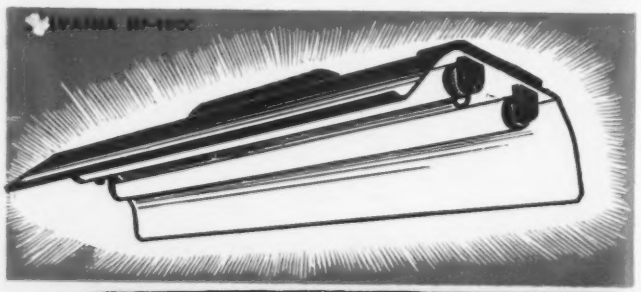


All-Purpose Type

The famous Sylvania "Fixture of the Future," which has proven so popular in war industry, is now available with a reflector drawn from 20-gauge steel, with a reinforcing lip. Finished with durable synthetic enamel. For either continuous-row or individual mounting.

HF-100S steel reflector has knockouts that provide for easy conversion from two to three lamps. The streamlined top-housing in all models has knockouts that make almost any type of mounting possible. Supplied in "complete packages of light" with lamps, starters, and ballasts, pretested, wired, and ready for immediate installation.

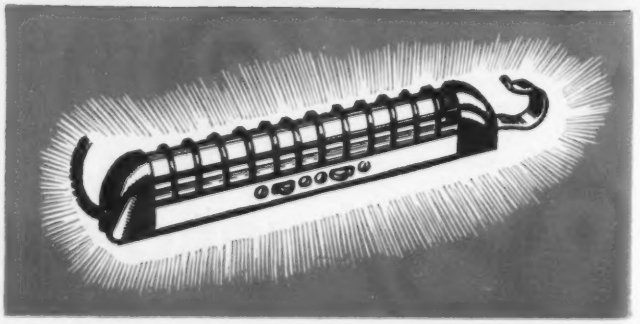
HF-100S—two 40-watt lamps
HF-150S—three 40-watt lamps
HF-235S—two 100-watt lamps

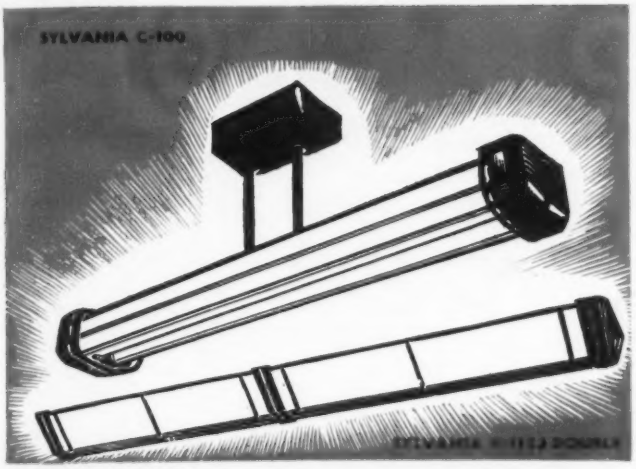


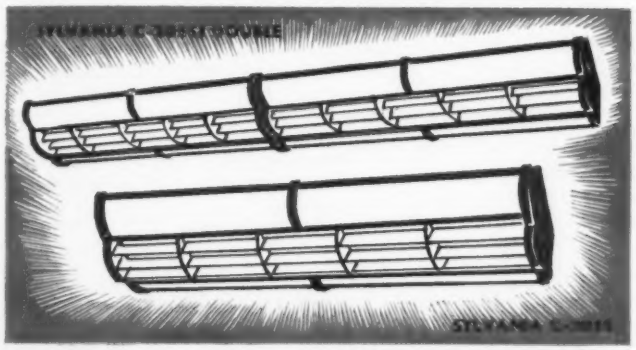
SYLVANIA
ELECTRIC PRODUCTS INC.
Salem, Massachusetts
Fluorescent Lamps, Fixtures and Accessories, Incandescent Lamps
Radio Tubes, Cathode Ray Tubes, Electronic Devices

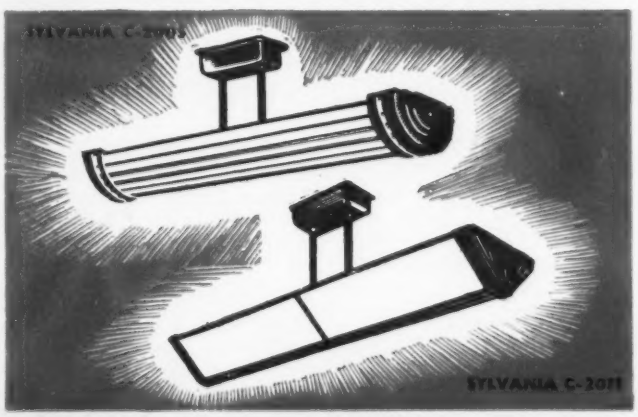
Portable FLUORESCENT WORK LIGHT FOR INDUSTRY

P-7 Sylvania Extension Cord Lamp makes fluorescent light portable for the first time. Compact dimensions — 10¼" x 1 3/16" x 1⅞". Goes anywhere the hand can reach in close-quarter work. Cool and adequate light from a 6-watt Sylvania Fluorescent Lamp is safe and efficient. Steel guard prevents lamp breakage. Handy hook leaves both hands free to work. Operates on 110-125 volts, 60-cycle, AC only.









Now there are SEVEN COMMERCIAL UNITS

Two-Lamp Shielded and Unshielded

It is now possible to resume the manufacture of this handsome and adaptable series. All models have steel reflectors and employ 40-watt lamps. This variety of models will make for wider fluorescent application to the commercial and institutional field.

Two 40-watt Lamps

C-100 unshielded with pendant
C-101 shielded with pendant
C-113 unshielded surface-mounted
C-115 shielded surface-mounted

All models are supplied with Sylvania Lamps as "complete packages of light."

Louver Type

These highly efficient fixtures are decorative in appearance but functional in design, with diffusing panels on each side of the lamps and louvers directly beneath. Equipped with four 40-watt lamps. Steel reflectors.

Four 40-watt Lamps

C-205S individual surface-mounted

Four-Lamp Shielded and Unshielded

These Sylvania Fixtures, which are ideal for stores, offices, laboratories and hospitals, now are equipped with 20-gauge steel reflectors finished with synthetic enamel. New design hinged end-caps and hinged diffusing panels make for easier and speedier maintenance. Supplied complete with four 40-watt Sylvania Fluorescent Lamps, Dua-Lamp Auxiliaries, and Starters — pretested and ready for immediate installation. Available with or without pendant.

Four 40-watt Lamps

C-200S unshielded, surface-mounted, individual
C-201S shielded, surface-mounted, individual

Leading Manufacturer of Fixtures in the Fluorescent Field

IF YOU HAVE A PROBLEM TO WHICH FLUORESCENT MIGHT BE APPLIED, WHY NOT CONSULT SYLVANIA ENGINEERS?

SYLVANIA "COMPLETE PACKAGES OF LIGHT"

Industrial Fixtures		*Commercial Fixtures*	
HFF-104	( )	C-100	( )
HFF-154	( )	C-101	( )
HFF-208	( )	C-113	( )
HFF-308	( )	C-115	( )
HF-100S	( )	C-205S	( )
HF-150S	( )	C-200S	( )
HF-235S	( )	C-201S	( )
P-7	( )		

SYLVANIA ELECTRIC PRODUCTS INC., Boston Street, Salem, Mass.
Dept. AF—744

Please send me information on the fixtures I have checked.

Name_____

Title_____

Firm_____

Address_____

City_____ State_____

"Sure, the Leo J. Meyberg Company can supply us with everything, but not that!"

Sorry, sailor, we have to draw the line somewhere, but sticking strictly to business we can probably help the Navy out. In fact we frequently do . . . along with the Army, and War Industry.

You see, Leo J. Meyberg Co. is in a strategic position, ready and able to supply hard-to-get electric and electronic materials. Ours is the most comprehensive stock of electric and electronic supplies in the West. Products and services available to you cover the entire range of the electromagnetic spectrum.

There's another feature to our service: in many cases engineering assistance is also supplied. For example, test and research investigation on the use of Near Infra-Red heat; especially designed and fabricated public address and broadcast systems; industrial lighting and electronic tube applications.

If you'd like to make use of our fast-moving service of supply, flash us an S.O.S.—we'll be on the job in a flash!

LEO J. MEYBERG CO.
Incorporated
70 Tenth St., SAN FRANCISCO, 3 TELEPHONE UN 1312
2027 S. Figueroa St., LOS ANGELES, 7 TELEPHONE PR 6011
MOST COMPREHENSIVE INDUSTRIAL ELECTRIC AND ELECTRONIC STOCKS IN THE WEST

BOOKS

you may want

RADIO DIRECTION FINDERS, by Donald S. Bond, 274 pages, 162 figures, 5¼x8¼; McGraw-Hill Book Co. $3.

This book deals with the direction finder as a specialized receiver. The many problems of wave propagation, antennas and input circuits are directly considered in the first half of the book.

The remainder of the book includes a detailed description of the R.C.A.-Sperry Mark 1 automatic direction finder, the Bendix Aviation Corp.'s MN-31 automatic direction finder and the R.C.A.-AVR-8F right-left direction finder. Complete circuit diagrams of these units are included.

Methods of testing according to Radio Technical Committee for Aviation and the Institute of Electrical Engineers are discussed, as well as methods of calibrating the equipment by field test.

The section on antennas compares the accuracy, pickup and other aspects of the loop, Adcock and spaced loop systems. A chapter is devoted to signal to noise ratio as it is influenced by the input circuit. The effect of noise in the accuracy of readings is stressed.

A chapter on aural direction finders and description and use of various types of navigation maps are included.

The author points out that military necessity has imposed restrictions on certain fields, but that the basic facts and general principles are stressed in this book.—K. N.

☆

PRINCIPLES OF POWDER METALLURGY, by Franz Skaupy, 80 pages, 15 illustrations, 6x9, Philosophical Library, New York, $3.

This small volume presents a study of powder metallurgy, particularly of tungsten and molybdenum powders and their transformation into lamp filaments and cutting tools. Following a brief preface and introduction, the booklet is divided into four parts, with an appendix outlining briefly some further fields for application of "metal ceramics." The section entitled "general part" discusses raw products and properties of ceramic metal parts. The succeeding chapters are given over to such subjects as the production of metal powders; properties of metal powders; production of definite sizes of grain; production from metal powder without binding agent; production from metal powder by employing a binding agent and production of alloys; properties of ceramic metal bodies; ceramics of wolfram, molybdenum, tantalum, and other metals; and ceramics of hard metals. In general, the book contributes relatively little new information to the subjects discussed.

☆

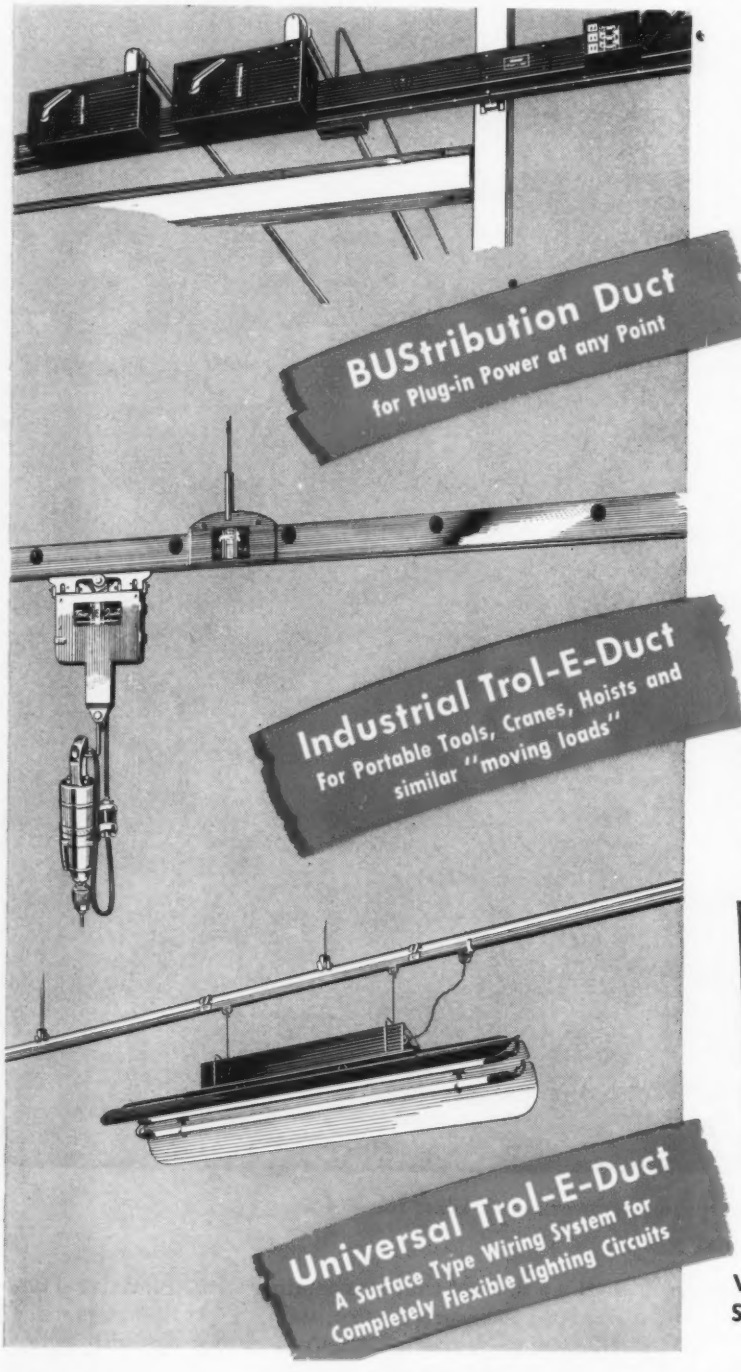
INDUSTRIAL ELECTRONIC CONTROL, by W. D. Cockrell, 247 pages, 5½ x 8½, index, 175 illustrations and graphs, McGraw-Hill Publishing Co., $2.50. The use of electronic devices in the industrial world has increased enormously during the last few years, making it very important for engineers to thoroughly understand the capabilities of electron tubes, and this book is written for such people who desire a good working knowledge of these devices.

(Continued on Page 14)

3505 BULLDOG INSTALLATIONS

In America's Largest Manufacturing Plants

WILL SPEED RECONVERSION


BUStribution Duct
for Plug-in Power at any Point
Industrial Trol-E-Duct
For Portable Tools, Cranes, Hoists and similar "moving loads"
Universal Trol-E-Duct
A Surface Type Wiring System for Completely Flexible Lighting Circuits

BullDog Duct . . . for power and light . . . will help in Peace Production Race

In thousands of *major* U. S. war plants, new and old, BullDog Electrical Systems have saved countless hours on installation and maintenance — greatly reduced changeover time—helped keep production at top speed and efficiency.

How? By making plug-in power immediately available for any shop set-up. By bringing power close to portable tools on any type of production line. By putting light close to the work on any kind of operation.

An Asset in the Postwar Race

When these BullDog-equipped plants get the go-ahead for reconversion they will again be out in front in the production race — and for the same reasons. Their flexible electric systems will be ready for even the most sweeping changes of product, plant layout or tool set-up.

To manufacturers — large or small — who have not yet installed this modern method of power and light distribution, BullDog offers the services of expert field engineers, to help in planning postwar operations.

Write now for complete descriptive material on BullDog BUStribution DUCT, Universal Trol-E-Duct, Industrial Trol-E-Duct and other BullDog products.

Buy Bonds to the Limit in the Fifth War Loan

BULLDOG

ELECTRIC PRODUCTS CO.

BOX 177, R. PK. ANNEX
DETROIT 32, MICHIGAN
BullDog Electric Products of Canada, Ltd., Toronto, Ont.

Field Engineering Offices in All Principal Cities

ALSO MANUFACTURERS OF
VACU-BREAK SAFETY SWITCHES · SWITCHBOARDS
SAFTOFUSE PANELBOARDS · CIRCUIT MASTER BREAKERS

BULLDOG PRODUCTS ARE SOLD AND DISTRIBUTED BY THE FOLLOWING PACIFIC COAST REPRESENTATIVES:

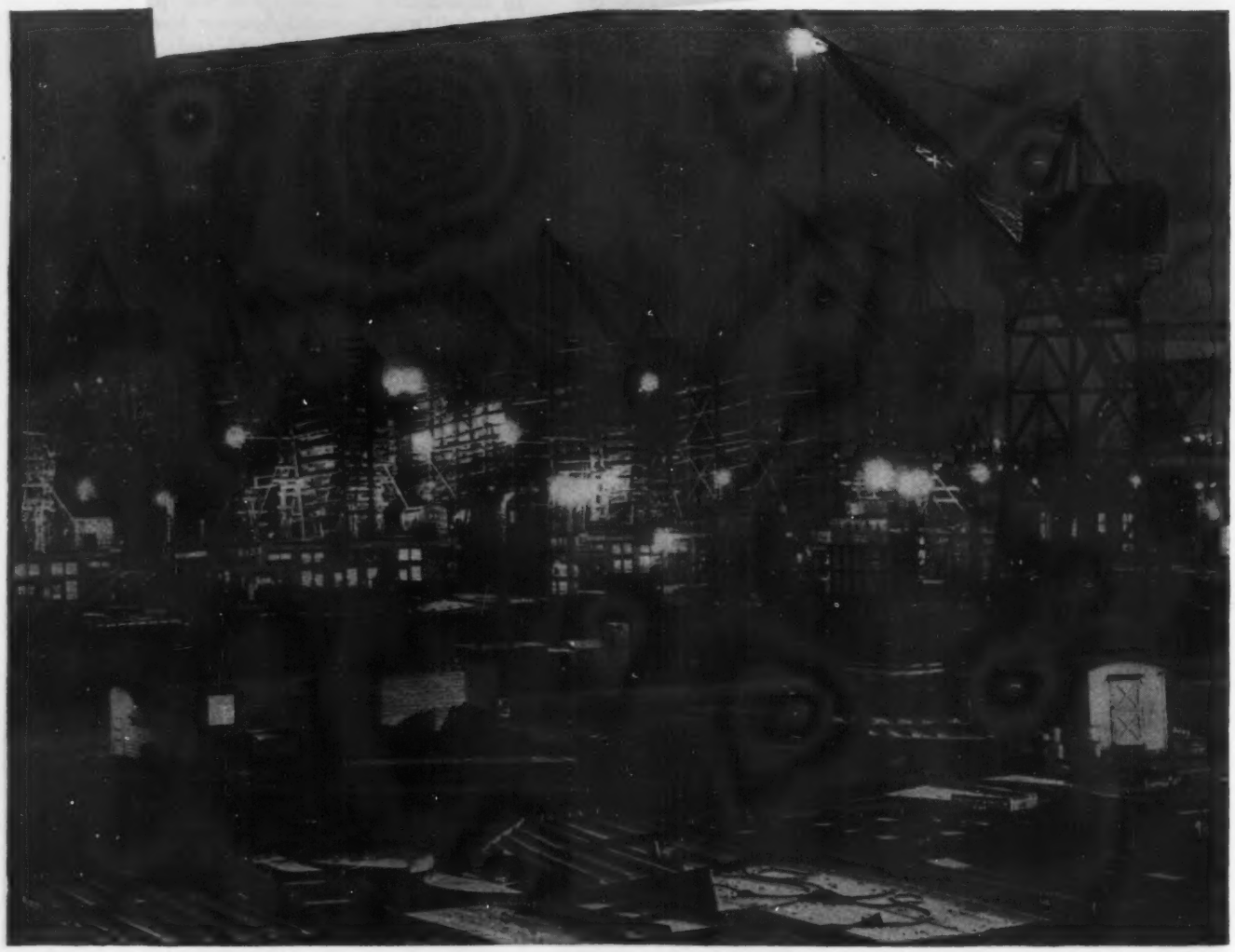
Coast Electric & Manufacturing Co.
1720 N.E. Sixth Avenue
Portland, Oregon, Tel. Garfield 2844

Safety Switchboard & Manufacturing Co.
1445 Stevenson St.
San Francisco, Calif., Tel. Hemlock 2470

Mullenbach Electrical Manufacturing Co.
2300 East 27th Street
Los Angeles, Calif., Tel. Jefferson 2224

FOR SALE

82 Billion Kilowatt Hours!



Night and day, American industry works full blast for victory

Last year the nation's power output climbed to an estimated 227 billion kilowatt hours.

That's nearly 82 billion more than in 1940.

Who is going to use this increased power production when the war ends?

We know of one peacetime market that will help take up the slack.

It's a market that's expanding with the natural desire for the leisure, luxury, and comfort that electricity can bring. A market that's building up with every dollar added to family savings.

We're talking about the use of labor-saving electrical appliances in the home. Not a new market . . . but one with new opportunities for power companies and appliance dealers alike.

All through the house . . .

Take the *all-electric home*, for instance . . . a home designed and constructed with appliances built in . . . with adequate outlets and wiring. We think many postwar homes in the moderate price range, as well as the more expensive houses, will be "all-electric" from blueprint to mortgage.

Homes already constructed will use more power, too. The *all-electric kitchen* with its refrigerator, electric range, water heater, and dishwasher; the *all-electric laundry* with its automatic washer and ironer are buying goals for many an American housewife.

And on the farm, too . . .

Still another power outlet . . . is the farm. Some 300,000 farms will probably hook on to the hi-lines each year after the war. According to the Edison Electric Institute, a farmer usually spends 30 per cent more for power than the average urban dweller. With farm incomes doubled since 1940, the rural home will probably absorb an even greater share of power production in the future.

Home surveys such as the one in Fortune magazine rank electrical appliances second only to automobiles on the list of planned postwar purchases.

But it won't pay to wait

General Electric is plugging into every one of these markets right now.

In widespread advertising we've been telling consumers, architects, builders, and bankers about the all-electric home and its place in the postwar construction picture.

We've been telling housewives about the relief from drudgery an all-electric kitchen or laundry can bring.

We've been telling farmers what a world of a difference electrification can mean to their families.

We hope you'll join us in this campaign for the increased use of power.

General Electric Appliance & Merchandise Department, Bridgeport, Conn.

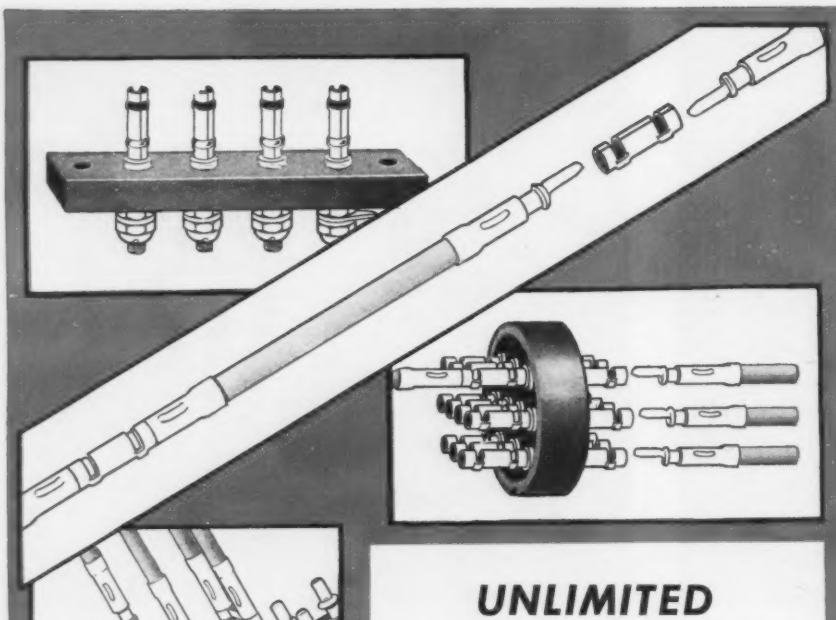
FOR VICTORY

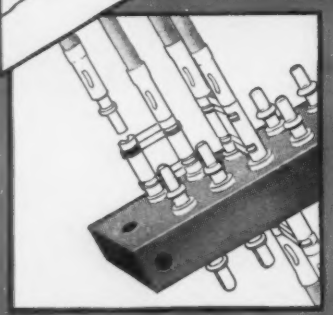
Today, General Electric is working full speed to hasten the day of Victory. *You can help, too, by buying War Bonds now.*

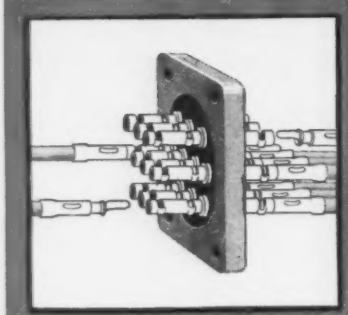
"Everything Electrical for After-Victory Homes"

GENERAL ELECTRIC

Tune in: "The G-E All-Girl Orchestra," Sunday 10 P. M., E.W.T., NBC—"The World Today" news, every weekday, 6:45 P.M., E.W.T., CBS.







UNLIMITED POSSIBILITIES

The T&B Sta-Kon Straight Pull Disconnect* Way of Wiring is opening up infinite new wiring possibilities for the electrical industry. Almost limitless combinations of unit and multiple assemblies can be made with the T&B Tips and Coupler because the Tips are identical and interchangeable. A few of the possibilities are shown here.

These new Approved Disconnect Devices are designed to connect, disconnect and reconnect *at will* all small wires #22–#10. And because they disconnect at a straight predetermined pull, they act as "mechanical circuit breakers"—disconnecting and breaking the circuit should the wiring be subjected to accidental external strain.

T&B Straight Pull Disconnect Devices are rounded and streamlined to the diameter of the cable to make insulating quick and easy.

They are part of the familiar T&B Sta-Kon Line of Pressure (solderless) Terminals. Easily installed with standard Sta-Kon pressure tools, manual or power.

We will fabricate and supply many arrangements of tips and couplers in any combination of wire sizes—#22–#10. We invite you to send us your specific design requirements.

All T&B products are sold exclusively through the service organizations of T&B Electrical Wholesalers.

For illustrated and technical Bulletin 522 on the Sta-Kon Disconnect Way of Wiring, contact your T&B Distributor through whom we distribute exclusively, or write your nearest T&B office.

The Thomas & Betts Co., Incorporated
103 N. Santa Fe Avenue
Los Angeles 12, Calif.

The Thomas & Betts Co., Incorporated
542 Natoma Street
San Francisco, California

Paul Douden & Co.
1645 Wazee Street
Denver 2, Colorado

F. A. Strohecker
301 Eyres Bldg.
2207 First Ave., S.
Seattle 4, Washington

*Pat. Pending.
Sta-Kon Reg. U. S. Pat. Off.

T&B THE THOMAS & BETTS CO. INCORPORATED
manufacturers of electrical fittings since 1899
ELIZABETH, N. J., NEW JERSEY

The theoretical phenomena of electronic tubes are omitted. The first section describes the fundamentals of various types of tubes such as vacuum, gas-filled, hot cathode, cold cathode, mercury pool types and special tubes such as cathode ray, secondary emission and photoelectric. The second section explains the use of inductance, resistances, capacitance and their relation one to another. Transformers, instruments, meters and relays are shown to be necessary circuit components. The third section describes the basic electronic circuit arrangements, such as half and full wave rectifier circuits, amplifiers, oscillator circuits, stabilizers, timing circuits and phase shift control. These circuits are combined in section four to form industrial electronic control devices which are in general use. Descriptions include motor speed control, counting devices, welder circuits, electric current regulators and many others.

The appendix covers standard symbols and nomenclature, resistance and rectance ohmic nomographs, rectifier wave shapes and photoelectric phenomena.

The material in this book is arranged to familiarize the individual with the existing electronic devices and acquaint him with the many possibilities of other tube and circuit combinations to provide more accurate and economical industrial tools.

☆

How to Pass Radio License Examinations, by Charles E. Drew, second edition, 320 pages, John Wiley & Sons, $3.

This book is based on the *Study Guide and Reference Material for Commercial Radio Operator Examinations*, as published by the Federal Communications Commission.

The questions and answers are representative in type and scope of the questions contained in the various elements of the commercial radio operator's examinations.

The book is divided, as are the examinations, into six elements. The presentation is in the form of questions and answers. The answers are in considerable detail, with well drawn illustrations and circuit diagrams.

An appendix covering radio laws, rules and regulations is included, as well as abbreviations used in code operation and miscellaneous tables and symbols.

☆

Electrical Essentials of Radio, by Morris Slurzberg and William Osterheld, 525 pages, well illustrated, McGraw-Hill Book Co., $4.

A definite need for this book has been felt by high schools and trade schools having extensive radio training programs. This book lays a complete foundation in a-c and d-c theory adaptable for students on the high school level. Although no vacuum tube circuits are included, all the principles of electricity are explained, using radio components and applications.

The book is modern in every respect, with all explanations according to the electron theory. Many photographs and drawings illustrate each point.

The necessary mathematics, including use of equations, square root, plotting and interpretation of curves and the use of vectors, is well illustrated as needed.

Twelve appendixes provide sufficient data to solve the 900 questions and problems in the book.

An introductory chapter on communication and a chapter on basic radio circuits are included.

The authors have a companion book soon to be released, entitled *Essentials of Radio*, which will be designed to follow this text.

2 TOP DEVELOPMENTS IN FLUORESCENT...TODAY

KOLD-VOLT COLD CATHODE
for Industrial Lighting

U.R.C. RESEARCH LUMINAIRE
for Commercial Lighting

Model No. 2081
MITCHELL KOLD-VOLT COLD CATHODE FLUORESCENT FIXTURE
Model No. 2032
MITCHELL U. R. C. RESEARCH LUMINAIRE
Surface or Suspension Mounting—
Individually or in Continuous Rows

Both MITCHELL

MITCHELL KOLD-VOLT Cold Cathode Industrial Fluorescent Fixture
The *first* cold cathode fluorescent in a standard *"packaged"* unit! Gives you *instantaneous starting — average lamp life expectancy 10,000 hours — greatly reduced maintenance!* 4-light fixture — 8 feet long overall — delivers a total of 8800 lumens of light. Each lamp unconditionally guaranteed for one year.

MITCHELL U.R.C. RESEARCH LUMINAIRE for Offices and Drafting Rooms
First introduced by MITCHELL. Combines the ultimate in high intensity illumination with low surface brightness (glare). Uses four 40-watt lamps. Takes less time to install than any other commercial fixture.

To get the Genuine MITCHELL Original U. R. C., look for this label!

Get complete information from your **MITCHELL DISTRIBUTOR** *or write for New Catalogs No. 278-280*

MITCHELL *Manufacturing Company*
2525 CLYBOURN AVENUE • CHICAGO 14, ILLINOIS

MITCHELL FLUORESCENT

Relentless RESEARCH

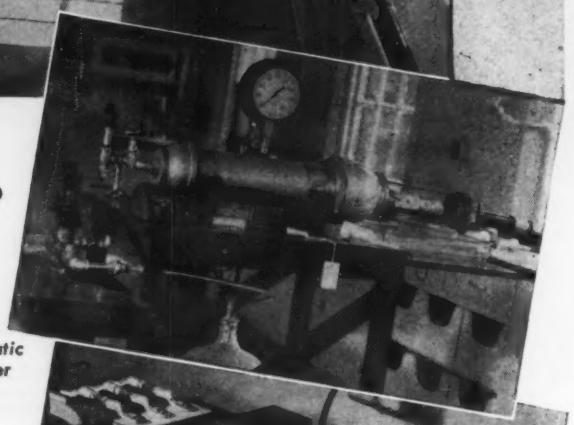
FOR BETTER ELECTRICAL CONNECTORS

Section of Burndy's test laboratory

...FOUNDATION FOR Burndy's LEADERSHIP

At Burndy, the development even of a small, special connector, means more than mere drawing board technique. It starts right from *bed-rock* . . . because only through complete laboratory findings on materials, design, and performance, can service efficiency be assured.

The constant, relentless research here in Burndy's completely equipped laboratory explains why so many outstanding connector developments stem from this source . . . and why industry relies on Burndy for the correct solution to any connector problem. Feel free to use this service at any time!



Hydrostatic Chamber

Vibration Machine

Corrosion Chamber

Headquarters for CONNECTORS

Burndy

BURNDY ENGINEERING CO., INC.
107 BRUCKNER BOULEVARD, NEW YORK 54, N. Y.
IN CANADA: Canadian Line Materials, Limited, Toronto 13

The entire family of ALCOA ALUMINUM BUS BARS *is at work here—*

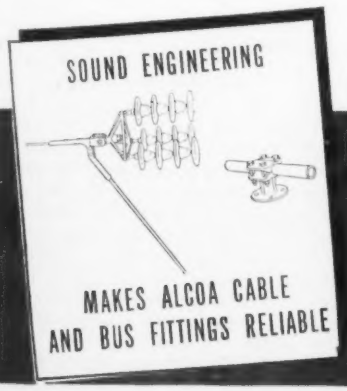
High in electrical conductivity, light in weight, corrosion-resistant, easy to handle; the designers took full advantage of these properties of aluminum in this industrial outdoor substation. Alcoa Aluminum bus bar shapes—channels, angles, flats and rounds—enabled them to meet all mechanical requirements most economically.

Vital wartime electrical loads are being carried by Alcoa Aluminum bus bars in every type of industry. Generating plants and substations, mills and factories, office buildings, battery rooms in telephone and telegraph systems; all are being supplied with power by these efficient, easy-to-maintain bus bars.

Now that the supply of aluminum exceeds the demands for military uses, Alcoa Aluminum bus bar shapes and fittings are again available. WPB Order M-1-i now permits the use of aluminum for electrical conductors. Users will find that, in installing aluminum bus bars, fewer man-hours are required. The lighter weight of aluminum makes transportation, handling and erection easier.

If you are considering the installation of new bus bars, or the extension of an existing system, consult Alcoa.

Our engineers are anxious to serve you. Write ALUMINUM COMPANY OF AMERICA, 2132 Gulf Building, Pittsburgh 19, Pennsylvania.



ALCOA
ALUMINUM

BUT what a difference ...when you know them!

All starters look alike but that's where likeness ends.

LLOYD STARTERS

- are assembled by skilled workers, trained to Lloyd standards.
- are checked and rechecked in the Lloyd factory and laboratory.
- are constantly checked and approved by nationally known laboratories.
- are superior in quality . . . in performance . . . in length of life.

Pat. Nos 2200443 2228210

LLOYD POLICY INSURES QUALITY

Lloyd Starters Are Listed and Approved by Underwriters' Laboratories Inc.
Canadian Engineering Standards Assoc.
Certified by
Electrical Testing Laboratory - Spec. 6
Certified to Fleur-O-Lier Standards

LLOYD PRODUCTS CO.
PROVIDENCE 5, R. I.
Representatives in 23 Leading Cities
Export Office: 13 E. 40th St., New York, N. Y.

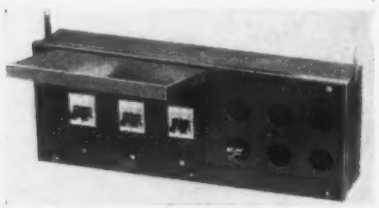
PRODUCTS

that are news

Scatter Box (700)

A scatter box designed by the Square D Co. permits control of temporary power and light circuits through a central unit protected by circuit breakers. Although it was designed for ship yards and aircraft plants, it is said to be applicable wherever a number of temporary circuits must be set up and torn down quickly.

This device is built for from four to eight circuits, with or without neutral. Circuits are protected by 15-amp, 115-volt single-pole, Type MO Multibreakers, although 20 or 25-amp breakers can be substituted.



Asbestos Airduct (701)

A fire-resistant asbestos airduct, which is said to save time and material in plane construction, has been developed by the United States Rubber Co. to replace metal in heating and ventilating systems. It is claimed that this material, which is made of fabric, asbestos and a coating of synthetic resin, makes possible lightening of the material used on heating and ventilating air duct systems by more than 10%. The fabric is pliable and can be used where pipe bending is necessary. Postwar uses of this material cited by the manufacturer include applications in homes, office buildings, trains, buses, ships and commercial airplanes.

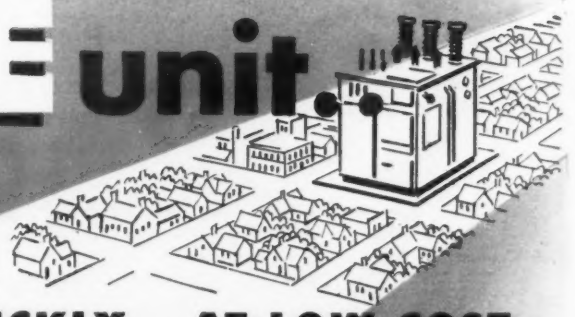
Connector (702)

A water-seal electrical connector, the Hysealug, is being offered by Burndy Engineering Co. This connector is made of copper and silverplated. The barrel is indented onto the conductor and the shroud is compressed over insulation to form a water-tight cable end seal. Installation is made with a Burndy Hypress and a dual die which indents the connector and compresses the shroud in one operation for cables up to 1,000 mcm. For Hysealugs above 1,000 mcm., installation is with separate dies for indentation and compression.

Tempering Device (703)

General Electric has announced a tempering attachment for use with synchronous spot welding controls incorporating the phase-shift method of heat control. The device is said to be particularly suitable for use in spot welding of air hardenable steels, since it permits tempering the weld while the work is still in the machine, thus reducing hardness and increasing ductility. It consists of a heat control and a time control adjuster for tempering and the relays which automatically transfer the additional heat and time adjustmnt from the spot welding control with which the attachment is used

Move ONE unit



QUICKLY... AT LOW COST TO NEW POSTWAR LOAD CENTERS

Westinghouse CSP Power Transformers contain in ONE UNIT:

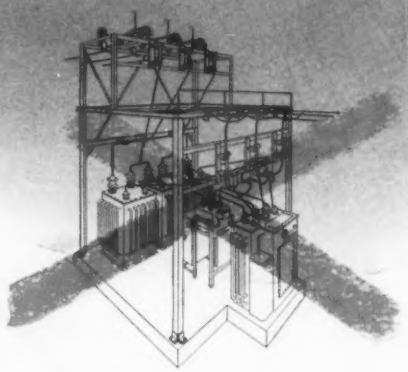
- transformer
- circuit breaker
- voltage regulator
- metering
- protection against —lightning
- protection against —overloads
- protection against —short circuits

. . . when it's a Westinghouse CSP (Completely Self Protecting) Power Transformer

Because the Westinghouse CSP Power Transformer can be moved as a unit, it has 100% salvage value when moved to a new load center. It can be moved by truck-trailer quickly—in a matter of hours. Compare this to the time required to disassemble and move the conventional single-feeder substation. The CSP Power Transformer saves both material and man-hours . . . will cut considerably your postwar system reconversion cost.

While new postwar load centers may be unpredictable, it will pay to have substations which can be moved in to fill the gaps. The Westinghouse CSP Power Transformer performs all the functions of a single-feeder conventional substation. It is Completely Self Protecting (CSP) against lightning, short circuits, and dangerous overloads.

For complete information, call your Westinghouse office, or write Westinghouse Electric & Manufacturing Co., Dept. 7-N, East Pittsburgh, Pa. J-70429



NOT THIS . . . piece-by-piece time-consuming removal and reassembly of the 43 major components of a conventional substation.

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

PACKAGED POWER

100H UNIVERSAL MATTHEWS FUSE LINKS

COVERED BY PATENTS 1,797,850, 2,067,577 AND PATENTS PENDING

BEST FOR CASCADING

5-N
Die Crimped
1 to 20 amps. inclusive are equipped with repulsion springs.
Die Crimped
Lead coated rope copper flexible tail. Won't corrode in sulphurous atmospheres.
Each link contained in strong paper tube.
25 links packed in each strong paper can.

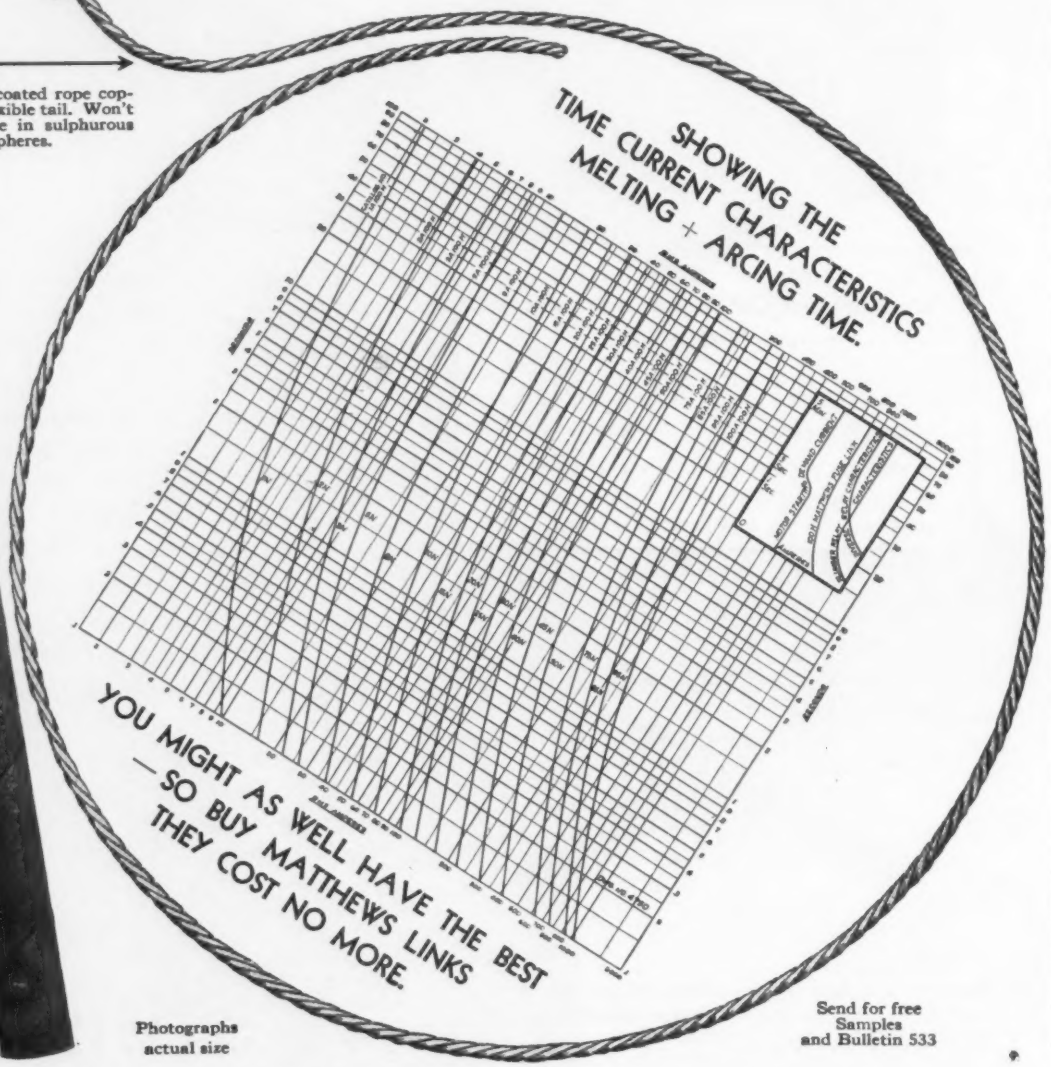
One user of 100-H Links makes it a practice before each lightning season to re-fuse all important cutouts. They claim that this gets rid of all overstressed links and prevents a lot of unnecessary outages and more than justifies its cost. A good way for you to find out that 100-H Matthews Fuse Links are better is to re-fuse some of your more important circuits now and watch the results through the next lightning season.

No solder used in them. Fusing elements are of hard drawn copper. They are mechanically stronger.

Their accuracy is guaranteed to be within 10% + or —.

In addition to the 17 sizes shown on the curves below they are made in ½, 125, 150, 175 and 200 ampere ratings.

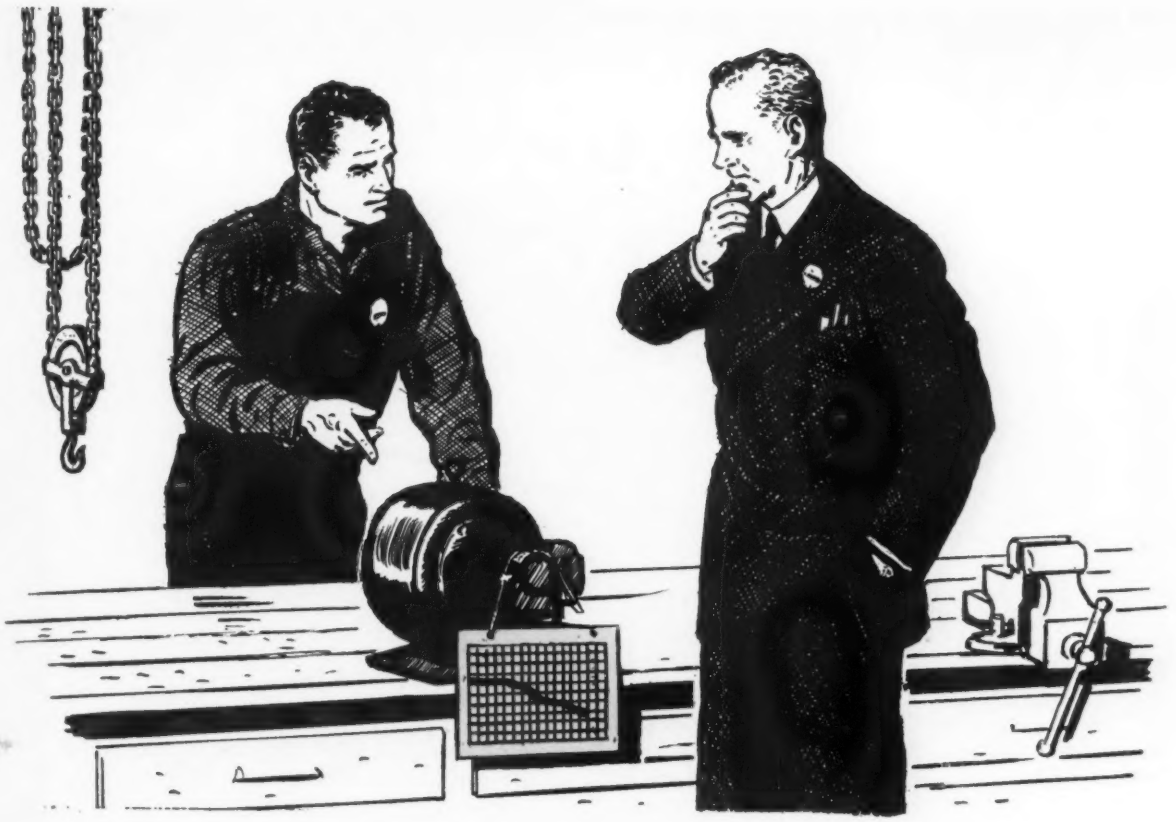
Photographs actual size. 100-H shown. 50-H same excepting that it 13 inches overall instead of 20 inches--the wartime length of Universal Fuse Links. (Longer lengths can be furnished, where needed, with WPB permission.)


SHOWING THE TIME CURRENT CHARACTERISTICS MELTING + ARCING TIME.
YOU MIGHT AS WELL HAVE THE BEST —SO BUY MATTHEWS LINKS THEY COST NO MORE.

Photographs actual size

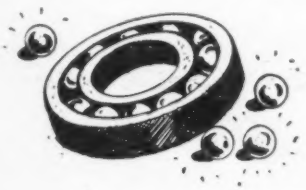
Send for free Samples and Bulletin 533

W. N. MATTHEWS CORPORATION, ST. LOUIS, U. S. A.



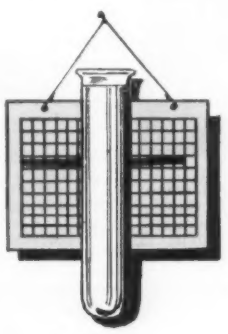
Poor grease can cost you power!

Some greases have high torque resistance or internal friction which can generate excessively high temperatures. When this happens, these greases melt out from their own heat, and motors burn up. Other greases tend to wrap around the bearings and restrict roll. For maximum delivery of power, electric motor bearings should spin with as much freedom as possible.



To obtain a grease that would shear easily, permitting bearings to spin freely and at the same time give adequate lubrication, Union Oil Company developed Ballroll.

Ballroll is a smooth grease with a high melting point, designed especially for high-speed electric motors. It will not separate, evaporate or gum up with age. Its unusually low internal friction properties permit the shaft to turn with a minimum of resistance and allow the motor to generate its *full power.*



Ballroll will not melt or run out under conditions of excessive external heat or when heavy loads are developed. It provides free, *easy* lubrication and adequate protection for all types of electric motors.

You can get a supply of Ballroll — or any other of the 492 petroleum products of Union Oil Company—delivered to you by phoning your local Union Oil Resident Manager.

Remember! You get *all* the power with Ballroll!

BALLROLL

Another

UNION OIL

Success-Tested Product

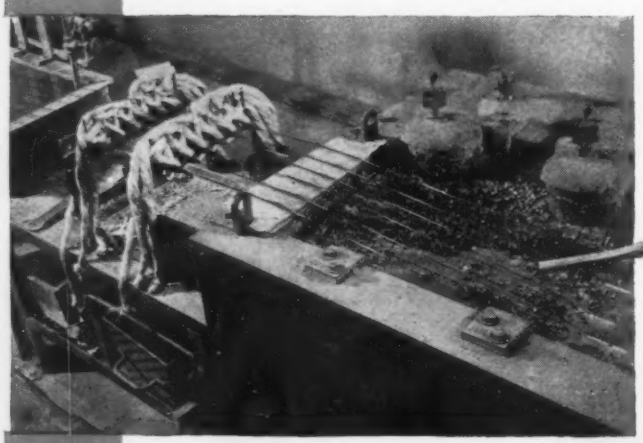
OKOLOY
was not drafted . . .
It volunteered in 1928

The war-caused shortage of tin forced many wire and cable manufacturers to search hurriedly for substitutes to replace the tin coating on conductors to prevent chemical reactions between the copper and rubber insulation.

In 1928, however, Okonite chemists, constantly discontent with run-of-the-mill practices, had developed and perfected Okoloy, a lead alloy coating that outlasts tin at least 2 to 1.

The old practice of "tinning" the copper conductors by passage through a bath of molten metal gave inadequate protection and too often led to failure and premature deterioration of expensive cables.

No war-forced substitute, Okoloy, for sixteen years, has been used to protect the copper conductors of all Okonite rubber insulated cables. When you specify any Okonite cable, Okoloy is just one of the "plus benefits" you obtain.



LASTING PROTECTION: After electrolytic cleaning, all Okonite copper wire passes through the Okoloy bath where, under carefully controlled temperature, the corrosion-resistant Okoloy coating is bonded to the conductor.

PROVED IN THE FIELD SINCE 1928: Section of Okoloy-coated wire removed for examination in 1941 after 13 years of service along right-of-way of a major railroad system, where it was continuously exposed to weather and to highly corrosive sulphur fumes. Note perfect condition of Okoloy coating and Okonite insulation.

THE OKONITE COMPANY, PASSAIC, NEW JERSEY

OKONITE INSULATED WIRES & CABLES

3700

ANOTHER PHASE OF UNIVERSAL'S "U" PLAN FOR "V" DAY

U plan for V day

Dear Mrs. Housewife:

We will have a common interest in household equipment following the war.

When victory comes the demand for appliances will ex-

"100 LETTER PLAN"

Universal is now offering a flexible, new direct-mail service to the more than 12,000 "U" Plan Dealers. Designed for easy, economical customer contact, the "100 Letter Plan" is virtually post-war business insurance at low rates. Based upon a pretested formula, Universal supplies letters, check lists and booklets ready for mailing over your signature. All you do is address to your prospective customers, mail and then file the returned check lists as a backlog of post-war business for ready follow-up. Results from dealer mailings in twenty-three states already indicate that it will pay big dividends.

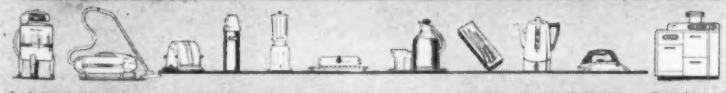
LOOK AT THESE PRETESTED RESULTS AND THEN ACT TODAY!

- **A Mid-West Furniture Dealer received 423 returns from a mailing of 4,000—better than 10 per cent.**
- **A Southern Hardware Dealer recently put nearly $10,000 worth of future business on his books at a cost of about $15.**
- **A New England Radio and Appliance Dealer received check lists from a mailing of 1,700 listing nearly $23,000 worth of appliances for post-war purchase.**
- **An Electrical Specialty Dealer in a North Central State secured 331 returns out of an initial mailing of 2,100.**

If you are already a "U" Plan Dealer, follow through with the "100 Letter Plan"—make it work for you right in your own sales area. The "U" Plan with its many features is open to any dealer. *If you are not already identified with it, send in the coupon at once for your 20-page Plan Book and extra information about the "100 Letter Plan".*

ARMY E NAVY

UNIVERSAL



LANDERS, FRARY & CLARK • NEW BRITAIN, CONN.

LANDERS, FRARY & CLARK Dept. EW
New Britain, Conn.
Gentlemen:
I wish to become a "U" Plan Dealer—please send free "U" Plan for "V" Day Plan Book to

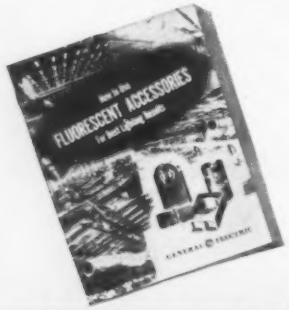
*Name*_____

*Address*_____

*City*_____ *State*_____

Reset It.. Forget It

HERE'S how the Watch Dog Fluorescent Starter simplifies lighting maintenance. When a lamp dies the Watch Dog automatically cuts itself out of the circuit stopping annoying blink and flicker. The manual reset button pops up preventing futile and needless starting attempts. Then the maintenance man can replace the burned-out lamp at his convenience. He merely presses in the red button, inserts a new lamp and the lamp immediately begins to operate normally. It's as simple as that. Just reset it and then forget it.



This new catalog tells how to use G-E Fluorescent Accessories for best lighting results. You can obtain your free copy by writing to Section G742-18, Appliance and Merchandise Dept., General Electric Company, Bridgeport, Conn.

★ BUY WAR BONDS AND KEEP THEM ★

Hear the General Electric radio programs: "The G-E All Girl Orchestra" Sunday 10 P.M. EWT, NBC. "The World Today" news every weekday 6:45 P.M. EWT, CBS.

GENERAL ELECTRIC

Preheating Equipment (704)

Illinois Tool Works has designed high-frequency plastic preheating equipment, which it claims reduces time required to seconds. According to the announcement, the heating is done between plates which are built into a cabinet. The plates are opened to receive the preforms and closed for heating, and are self adjusting to accommodate preforms of various thicknesses.

The movable plate has a heat retainer, which maintains the temperature in the preform after the high-frequency is off, allowing greater time between the preheating and loading of the press. After a predetermined time, an automatic timer cuts off the heating and a light on the panel board. A meter indicates in watts the amount of heat per second that is generated in the preforms.

Stability Gauge (705)

General Electric has a crane stability gauge for use on boom type cranes and similar equipment, and which it claims eliminates dependence on the operator's judgment and permits maximum use of the crane. This device safeguards equipment by constantly measuring its stability, against handling loads in excess of the rated capacity at a given radius and against extending the boom to an excessive radius for a given load.

The device consists of a strain gauge and an accompanying balance unit, an indicating unit, a constant-voltage transformer and a boom angle compensator.

Controllers (706)

Wheelco Instruments Co. has added three instruments to its line of industrial controllers and has improved a fourth unit. Two of the new models are to control input of power, heat or flow of liquids or gases to any process equipment. The third is to correct variations in heat requirements of furnaces and process equipment by positioning a valve in the fuel line. The company's manually operated controller for regulating input to electrically operated furnaces, ovens, heaters and kilns is now being made with a flush mounted case.

Aircraft Switch (707)

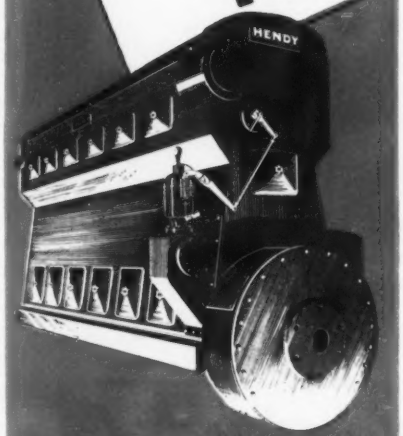
Square D is offering the class 9315 Aneroid switch to supplement its line of aircraft electrical control devices. Designed for close control of engine superchargers, the unit is said to offer possibilities in other applications involving electrical control responsive to altitude change. It is suitable for use over a temperature range of minus 65°F to plus 160°F. Operating range is up to 35,000 ft., with a minimum differential of 1,000 ft. Net weight is 24 oz. At 28 volts d-c, the switch will handle up to 25 amp. in-rush current on solenoids, etc.

Tool Room Etcher (708)

To suplement its machine shop model etcher, Ideal Commutator Dresser Co. has announced a tool room metal etcher. This tool is for marking tools, gauges, reamers, dies, punches, jigs, fixtures, etc. Four etching heats are 120, 240, 420, and 700 watts. Features include red indicating lamp, protected four-heat switch, removable hinged cover, terminal tap for 2-oz. etching tool and renewable work plate. Over-all size 7¼ x 5½ in.; weight 16 lb.

Only HENDY DIESELS Combine all these Features!

TOMORROW'S DIESEL TODAY



GENERAL SPECIFICATIONS
SERIES 50
Bore—12"; Stroke—15"
Speed—350 to 600 RPM
Rated Power at 450 RPM—
75 hp. per cyl.

Write for complete data on the Hendy Series 50 Diesel Engine

- Unit-type fuel-pump injectors
- Dual alloy-steel intake and exhaust valves
- Jet action cooling in cylinder head
- Cross-heads which eliminate side thrust from rocker arm
- Hydraulic tappets that eliminate valve adjustments in service
- Overhead-type camshaft
- Centrifugally cast, babbitt-lined, steel-backed bearings
- Double bearing at flywheel end
- Rigid steel engine bed
- Welded-steel cylinder block with sleeve liners
- Forged-steel or cast-alloy crankshaft
- Forged-steel connecting rods
- Oil-cooled cast-iron pistons
- Cage-type relief valve and compression release
- Improved type camshaft chain drive system
- Auxiliaries engineered to suit application
- Integral fresh-water cooling
- Positive, full-automatic lubrication
- Mechanical or hydraulic governing
- Water-cooled exhaust manifold
- Starting and operating controls centralized at gauge board
- Friction clutch for power takeoff, as optional equipment

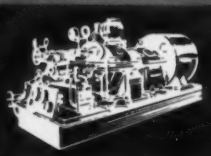
For simplicity—long life—for modern design—look to Hendy!

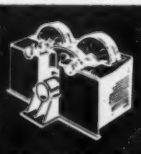
JOSHUA HENDY Division
JOSHUA HENDY IRON WORKS

ESTABLISHED 1840

SUNNYVALE, CALIFORNIA

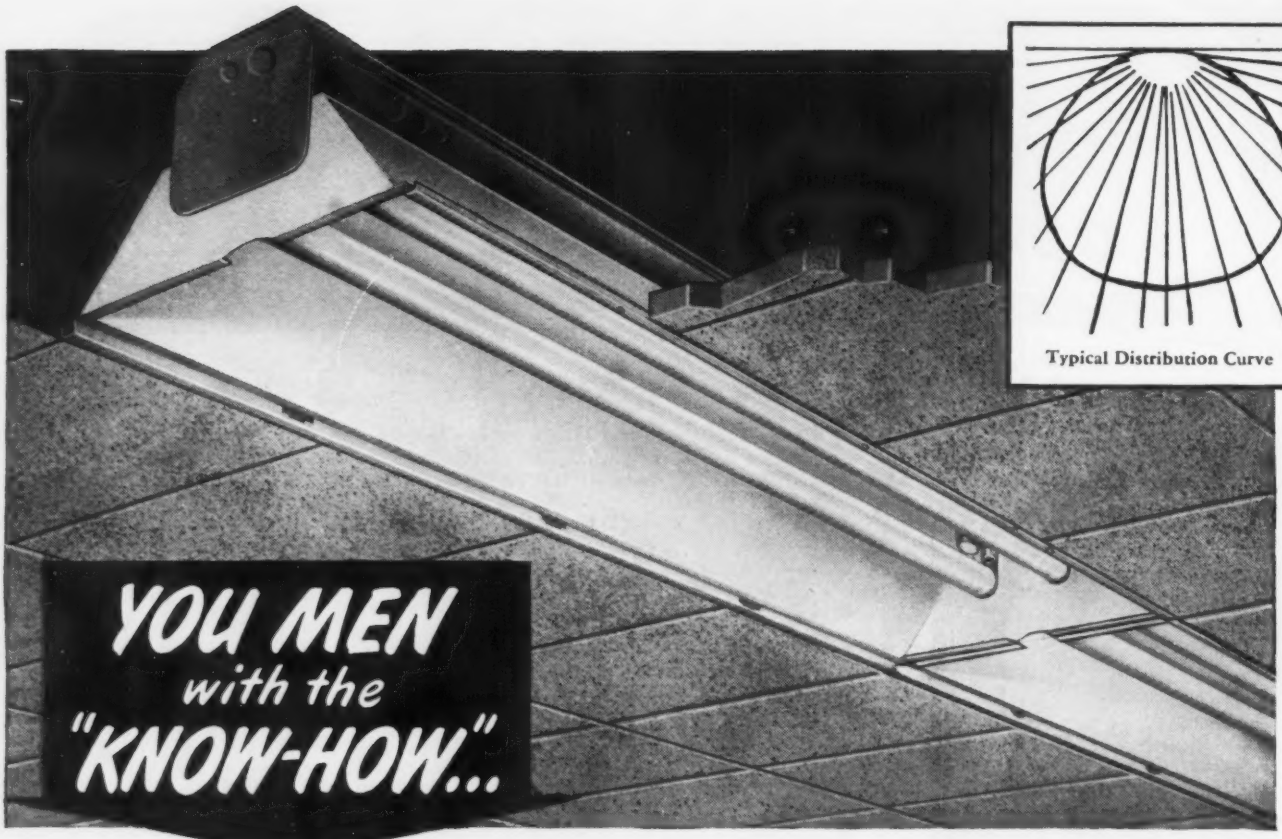
BRANCH OFFICES: Boston • Buffalo • Chicago • Cincinnati • Cleveland • Detroit • New York • Philadelphia • Pittsburgh • San Francisco • St. Louis • Washington • Los Angeles

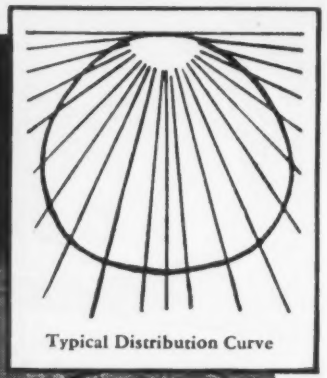

TURBO-GENERATORS


REDUCTION GEARS

STEAM TURBINES

DIESEL ENGINES




Typical Distribution Curve

Here's lighting you can plan to Do Things with...for offices, schools and stores!

Miller continuous Fluorescent Lighting Systems are the triumph of 100 years of lighting leadership. 100 years of trial and error and success. 100 years of wide experience with all light sources and all fixture types and materials.

Miller systems have solved the worst lighting "bottlenecks" on our production front. They are so versatile and practicable—and attractive—that their possible uses meet most architectural requirements.

The Miller two-light Troffer shown above is an indication of advance*Miller pioneering to broaden still further every lighting benefit offered by the original Miller lighting system. It can be installed (easily and in almost any type ceiling) in individual units, in any combination or grouping of units, or in continuous rows—BY THE MILE!

It is economical to install, economical to service and so flexible in its application that almost any level of illumination can be obtained for a given area.

Miller works not only with fluorescent but also mercury-vapor and incandescent—so Miller Engineers are unbiased in their recommendations. Miller Engineers are in principal cities and it's their job to help you lick your problems. So call in a Miller Engineer for a round-table talk—or call us directly.

It's just that easy to cash in on what 100 years have taught us!

Shown now only for your advance planning

IMPORTANT REASONS FOR SPECIFYING MILLER LIGHTING SYSTEMS

- **Low Installation Cost**
- **Simplified Maintenance**
- **Uniform Illumination**
- **Attractive Design**

THE MILLER COMPANY • MERIDEN, CONNECTICUT

ILLUMINATING DIVISION
Fluorescent, Incandescent
Mercury Lighting Equipment

OIL GOODS DIVISION
Domestic Oil Burners
and Liquid Fuel Devices

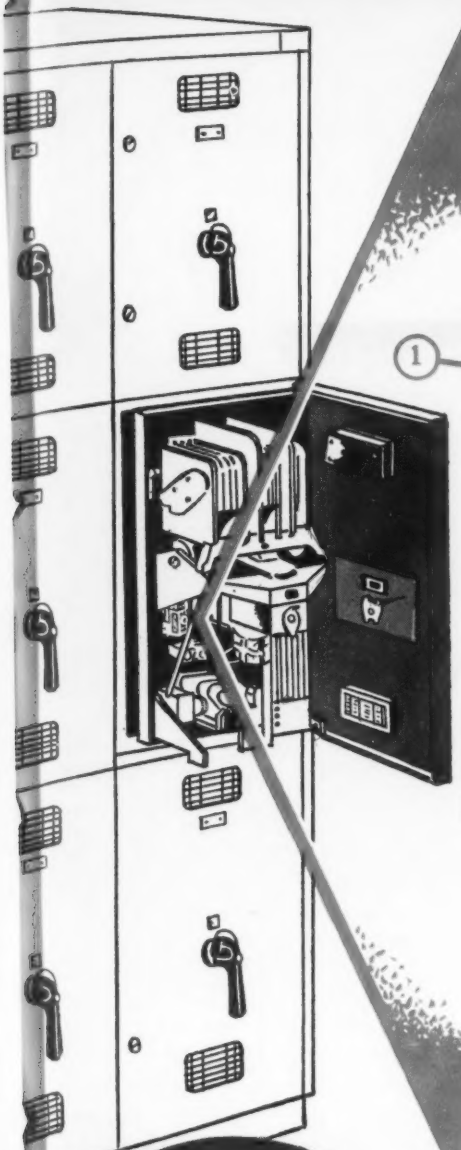
ROLLING MILL DIVISION
Phosphor Bronze and Brass
in Sheets, Strips and Rolls

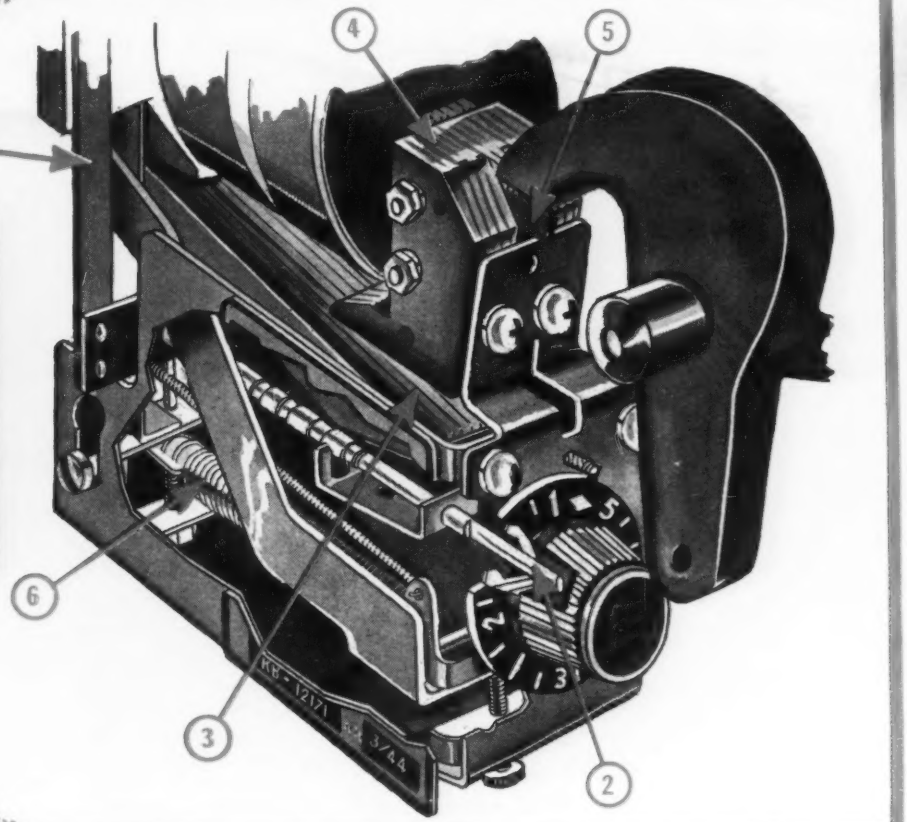
WAR CONTRACTS DIVISION
War Materiel

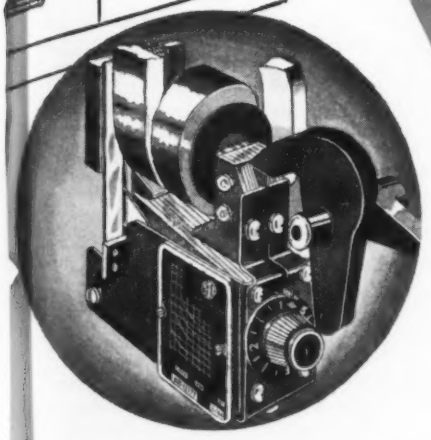
MILLER
SINCE 1844

eatures of I-T-E DRAWOUT SWITCHGEAR

A-C Motors get full protection with this Dual Thermomagnetic Overcurrent Trip







Mounted on the side of each Thermomagnetic Overcurrent Trip is a plate showing typical time-load curves corresponding to identified dial settings. The dial is notched to permit intermediate settings, numbering fifteen in all. A spring lock prevents accidental turning of the knob.

(1) **BIMETAL ELEMENT**, heated inductively, causes circuit breaker to open on normal overloads only after a selected time delay. Full voltage starting is permitted with heavy inertia loads yet protection is given against light, continuous overloads such as single phasing. Heating of the element is so arranged as to avoid burnout or permanent distortion. No current flows through the bimetal.

(2) This **SHAFT** is moved forward by the heated bimetal element in starting the action of tripping the circuit breaker. The tripping effect of the forward motion is adjustable at the knob into which the shaft fits. This is like changing the bimetal heating characteristics in relation to the characteristics of the protected motor or in relation to ambient temperature.

(3) This **ARMATURE** moves, in tripping action, either in response to a preselected temperature in the bimetal or to the existence of an overload in the motor circuit equal to twelve times the rated current of the circuit breaker. This gives instantaneous opening on short circuits yet provides time delay for starting peaks and light overloads.

(4) An **ELECTROMAGNET**, energized by a surrounding series coil, has three functions: to attract the armature for direct tripping of the circuit breaker in response to extremely heavy overloads and short circuits; to serve in inductively heating the bimetal element on light overloads and by saturation to control the effect of overcurrents on the heated parts in order to prevent burnout or damage to the bimetal element.

(5) A **TRIPPING PIN** is driven against the latch of the circuit breaker when the armature is attracted to the magnet. Circuit conditions which affect the magnet are directly translated into circuit-opening action when opening is necessary.

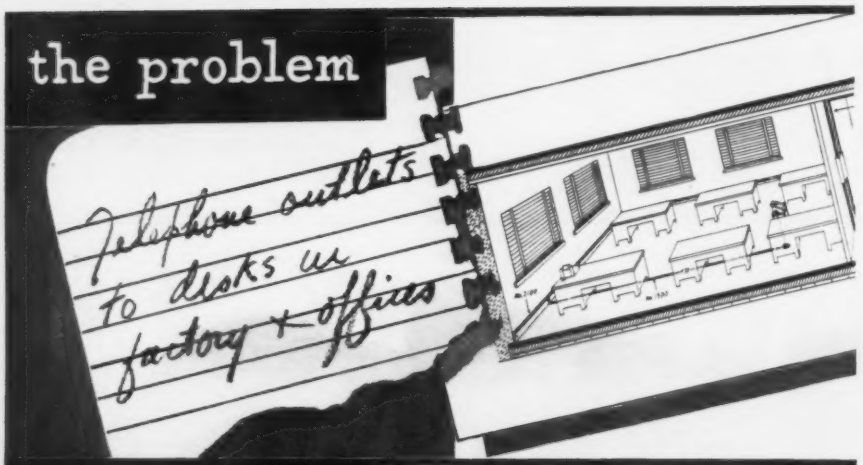
(6) This **SPRING**, which carries no current, is preloaded to supply the correct restraint on the armature so that overcurrent of less than 12 times the rated current of the circuit breaker will cause opening only after an exactly appropriate time delay.

In combining the best characteristics of thermal overload devices and magnetic tripping, the I-T-E Thermomagnetic Trip provides protection for individual A-C motors against the effects of both light and heavy overloads. The breaker is tripped before dangerous motor temperatures are reached, but the breaker is not opened needlessly. The time-current characteristics of the device can be adjusted in exact keeping with the heating characteristics of the motor. Motors so protected can be used at full rating. For complete information, call your nearest I-T-E representative or write to I-T-E Circuit Breaker Company, 19th and Hamilton Streets, Philadelphia 30, Pa.

Representatives in Principal Cities

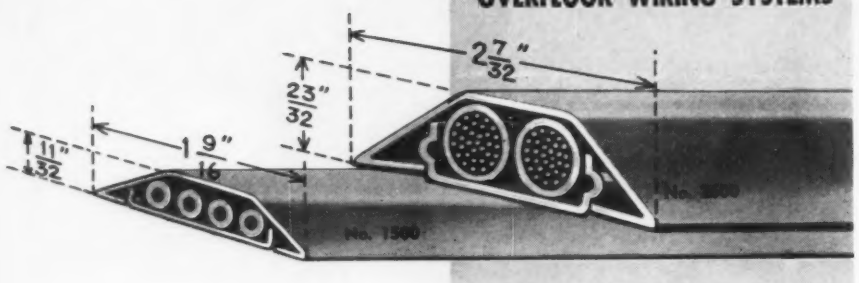
I-T-E AIR SWITCHGEAR

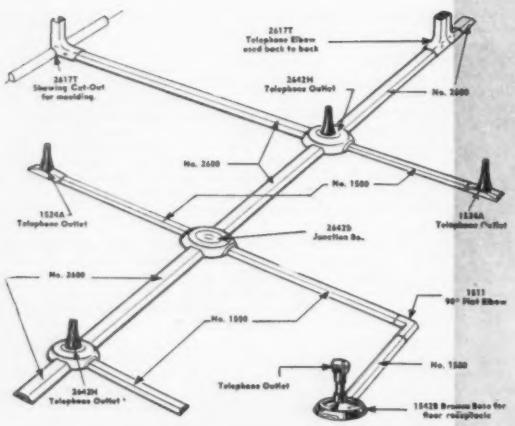
the problem



the answer

PANCAKE
WIREMOLD
OVERFLOOR WIRING SYSTEMS





● Wiremold PANCAKE is the safe, simple, practical way to handle all those situations where telephone or light and power circuits must be brought to locations out in the middle of a floor area . . . where the necessary wiring is being laid out for desk installations in general offices, or where changes require relocation and extension of already installed wiring systems. No. 1500 PANCAKE is for general telephone or light and power service installations; No. 2600, with greater capacity, is especially designed for general office telephone system work. Write for new PANCAKE bulletins full of helpful suggestions.

CAPACITY:
No. 1500 4 No. 12 R. C. Conductors
No. 2600 Two 26-pair telephone cables.

WIREMOLD CAN HELP YOU PRODUCE FOR WAR . . . WHILE YOU PLAN FOR PEACE!

KNOW YOUR
WIREMOLD
AND YOU KNOW THE ANSWERS

NEMA

THE WIREMOLD COMPANY HARTFORD 10, CONN.

Unit Heater (709)

Electric Air Heater Co. has introduced 14 additional standard electric unit heater models. These heaters are said to incorporate one-piece finned aluminum elements used in the manufacturer's complete line with recent refinements in enclosure and deflector designs. Six models, 1.5 kw. to 7.5 kw., can be used as portable heaters or for ceiling or wall suspension. Larger sizes, from 10 to 60 kw., are for ceiling or wall suspension only. BTU per hour is said to range from 5,122 to 204 900.

Control Housing (710)

For housing aircraft control devices, General Electric Co.'s new standard dust-tight enclosure accommodates G-E control relays and contactors with ratings up to and including the 100-amp aircraft contactor. This enclosure is made of aluminum, with cast aluminum end frames. A self-locking latch permits removal of the cover of the enclosure in a vertical direction without disconnecting wires or use of tools; has a provision for wire locking the enclosure. End plates are adaptable for various sizes AN connectors or terminal posts.

Print Dryer (711)

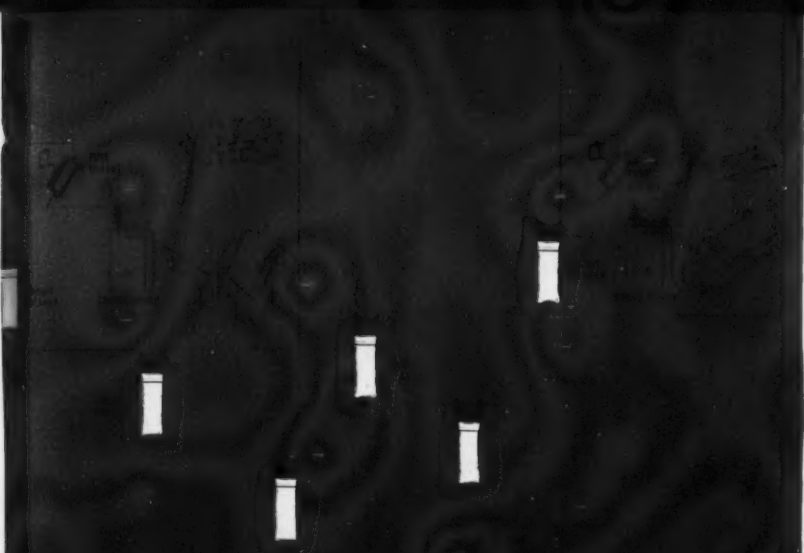
An electrically heated print dryer, equipped with variable speed drive motors and controllers, is being manufactured by Peck and Harvey. Instantaneous speed changes over a range of 6 in. to 3½ ft. per minute are permitted, according to the announcement. Two sizes are available, a 26-in. and a 44-in. model. Current consumption is said to be 14 amp. on 110 volts for the 26-in. and 23 amp. on 110 volts for the 44-in. dryer.

Snap-Action Switch (712)

Acro Electric Co. is making a small snap-action switch, engineered on the rolling spring principle. This switch is $^{17}/_{64}$ in. thick, $^{13}/_{16}$ in. high and $1^{3}/_{16}$ in. long. Actuation is with a stainless steel pin plunger. Main blade, contact blade and rolling spring are of beryllium copper. Rated at 15 amp., 115 volts a-c. Furnished in single pole, normally open and normally closed, double throw.

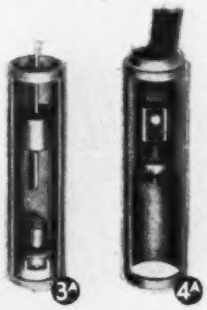
New Formex Sizes (713)

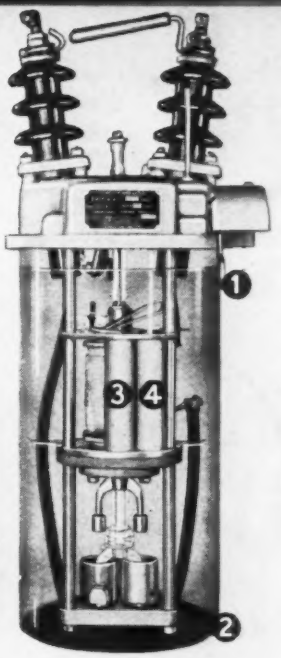
General Electric Co. has announced Formex ribbon-rectangular magnet wire in shapes as thin as 0.004 in., said to be one-fourth the size heretofore considered the low limit for thickness of this wire.



RATINGS OF
KYLE
CIRCUIT BREAKER

2300 to 15,000 volts a.c.
Nominal Ratings: 3 to 50 amperes
Minimum Trip Currents: 8 to 12 amperes
Interrupting Capacities: 75 to 1200 amperes
Weight With Oil: 135 pounds





22 Service Trips Saved Will Buy a KYLE Oil Circuit Breaker

Every time a line outage requires you to send your service man out to restore service on a feeder line it costs you a minimum of $4.50. It ties up a man's time . . . it wears out your truck and your tires. The interrupted service makes the customer mad.

The Kyle Oil Circuit Breaker will automatically restore service after temporary faults that make up 85% of line difficulties. By operating one, two and three times before locking out, the Kyle Circuit Breaker will make unnecessary the great majority of such service trips . . . immediately restore service that might otherwise take hours.

It only takes 22 such trips to pay for a Kyle Oil Circuit Breaker that will give this dependable, trouble-free protection to your lines for many years. Add up the number of this kind of trips your men made last year. Multiply them by $4.50 and you will have some idea of the savings that Kyle Oil Circuit Breakers can give you.

In these days when manpower is a problem, when trucks, tires and other equipment are too valuable to waste, it is more important than ever to install Kyle Oil Circuit Breakers.

Furthermore, the KYLE Oil Circuit Breaker Has These Distinct Advantages

The Kyle Oil Circuit Breaker is the only circuit breaker which makes use of dependable hydraulic timing . . . no complicated clockwork mechanisms . . . no motors. Kyle Circuit Breakers are safe . . . triple safe. The normal position of the breaker is the safe, open position with the handle (1) down. The operating handle and tank are always dead. There is no terminal in the bottom (2) of the tank. Kyle Oil Circuit Breakers are easy to handle, easy to mount with standard transformer tools.

And Here Is How the KYLE Circuit Breaker Operates

These two pistons are the operating heart of the Kyle Oil Circuit Breaker—the heart of its dependable hydraulic timing system—no other breaker is so timed. The retard piston (4A) is attached to the contact closing mechanism through the Bakelite tie link and rides in the cylinder as shown. The piston moves up as the contacts open. Reclosing of the contacts is hydraulically delayed by restricting the oil flow past the piston while in the upper cylinder. When the piston reaches the lower cylinder, free drop results in fast closing of the contacts.

The release piston (3A) is actuated upward by the pumping of oil under the piston in measured amounts. The plunger acts as a pump, making an injection each time the breaker opens. After four operations in succession the piston is driven high enough to trip the release latch, opening the breaker to the lock-out position. If it is not necessary for the breaker to lock out, the release piston settles back to its initial position, resetting the breaker for another complete cycle of operations. Figures refer to cutaway view shown above.

KYLE Circuit Breakers Are Designed and Manufactured for
LINE MATERIAL COMPANY, MILWAUKEE, WISCONSIN

KYLE CORPORATION
SOUTH MILWAUKEE, WISCONSIN

Announcing

A booklet entitled "A Report to Industry on Simplex Synthetic Rubber Insulations" is now being printed.
You will want a copy because it is an up-to-date report of rapid progress and remarkable results in the transition during the past months from natural to synthetic rubber insulations and sheaths for wires and cables. It shows how Simplex quality is being maintained by the technical knowledge and manufacturing skill that enables us to get best results with the new materials.

The report contains valuable information that proves that synthetic compounds, when properly designed, are equivalent in service to the natural rubber insulations and sheaths they have replaced. Our chemical and engineering laboratories have done notable work in developing these new materials upon which we depend for Simplex quality and Simplex service.

As soon as the report is ready for distribution we would like to send a copy to you because we believe it will be of real interest. Your request for it by postcard or letter will receive prompt attention.

Simplex Wire & Cable Co., 79 Sidney Street, Cambridge 39, Mass.

Simplex
WIRES and CABLES

PACIFIC COAST OFFICES

390 Fourth St., San Francisco, Calif.
910 East Third St., Los Angeles, Calif.
503 Polson Bldg., Seattle, Wash.

These Ducts
HAVE WHAT IT TAKES
—for reliable cableway service

Here are some outstanding reasons why J-M Transite Conduit and Korduct serve so well under the most severe conditions—

Inorganic . . . made of an asbestos and cement composition which provides permanence and strength, makes the ducts immune to rust or rot.

Permanently smooth bore . . . long cable pulls and replacements are made easier. Danger of damage to cables is minimized.

Easily and quickly installed . . . long, light-weight lengths and simple assembly method assure rapid, economical installation.

Immune to electrolysis . . . being entirely inorganic and non-metallic, these ducts are not affected by electrolytic or galvanic action.

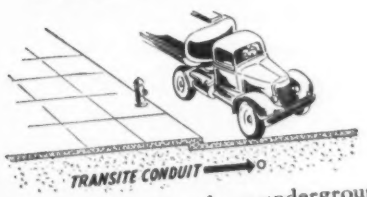
Lower cable temperatures . . . an advantage resulting from a relatively high rate of heat dissipation.

Incombustible . . . won't contribute to the formation of dangerous smoke, gases, or fumes. If burnouts do occur these inorganic ducts provide maximum protection to adjacent cables and permit easy removal of damaged conductor.

* * *

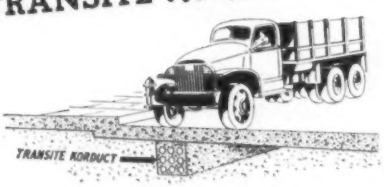
For complete details on Transite Ducts, write for Data Book, DS-410, Johns-Manville, 22 E. 40th St., New York 16, N. Y.

TRANSITE *CONDUIT*



For exposed work and use underground without a concrete encasement.

TRANSITE *KORDUCT*



For installation in concrete. Thinner walled but otherwise identical with Transite Conduit.

JOHNS-MANVILLE **TRANSITE DUCTS**

Electrical equipment lives no longer than its insulation . . . but how long will different types of insulation live—and why? There's one simple answer . . .

use the insulation proved by FIFTY YEARS OF FIELD TESTS!

Westinghouse is in a natural position to know the answers to these problems. The wide variety of electrical apparatus made by Westinghouse during the past half century has served as a continuous, "first-hand" field test for almost every possible type of insulating material.

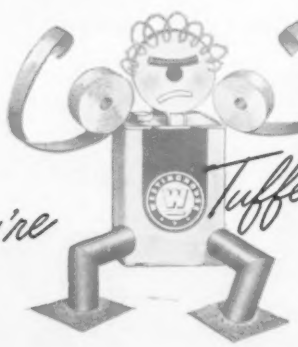
Out of this constant development has grown the complete line of "Tuffernell" Insulating Materials. And with it, an authoritative file of exact application data that is made available to you by Westinghouse Insulation Specialists.

The new "Insulation Sample Book" illustrates this "insulation know-how". It simplifies selection of tapes, fabrics, papers and varnishes by supplying actual samples, complete with dimensions, ratings and helpful application data. Copies are available through your nearest Westinghouse distributor. Ask for B-3322. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N. J-06357

Westinghouse

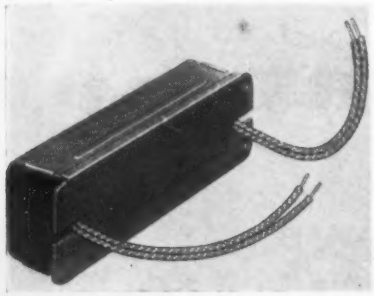
PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

INSULATING MATERIALS



"They're Tuffernell!"

Ballast (714)



A high-voltage, tulamp ballast for use with 40-watt instant-starting fluorescent lamps has been announced by General Electric Co. According to the manufacturer, this ballast applies 450 volts to the lamp at starting, striking an arc between the lamp cathodes and eliminating need for separate starter equipment. It is available in tulamp 40-watt ratings for use on 118-volt circuits.

Autotransformers (715)

General Electric is offering two small size autotransformers especially designed to furnish a-c voltage for 400-cycle aircraft instruments. A 6 volt-amp. unit weighs 2 oz. and a 12 volt-amp. unit weighs 3 oz. The units are approximately 1¾ x 1¼ x 1 1/16 in., and both operate over a frequency range from 380 to 420 cycles. They can be applied on planes having a 110-120 volt a-c power source.

Time Delay Relay (716)

A time delay relay for surface mounting has been announced by the R. W. Cramer Co. This device has a special overtravel mechanism which delays complete recycling in case of momentary power interruptions and a moistureproof surface type mounting case. According to the manufacturer, it is for control of the closing of plate circuits as in radio transmitters or rectifiers.

Fan Blades (717)

Torrington Mfg. Co. has added new sizes of propeller fan blades. A 27° pitch has been added to the 10- and 12-in. diameters in the standard series and there is a new unit in the pressure type fans. In the Autocrat line, 8- and 10-in. diameters, each with five blades, have been introduced. A 5½-in. five blade, formerly a special, is now listed as standard in the Autocrat line.

Electrode Holder (718)

Allison Tool & Engineering Co. has a new electrode holder in two models—a 19-oz. unit for 300-500-amp. work and a 6¼-oz. unit for lighter jobs. The holder is designed for mechanical or solder cable connections; is said to permit quick change and burning of electrodes to within one-half inch of the holder tip.

300-Amp Holder (719)

Martin Wells has added to its line of electrode holders a 300-amp. unit which is said to be lighter, shorter and of smaller diameter than previous models. Features listed by the manufacturer are adaptability to close quarter work, high electrical conductivity, ease of handling. Weight 14 oz.; length 8¾ in.; handle 1¼ in. in diameter.

Include
KLEINS
in your planning

NEW power lines—new communication lines are being planned for construction as soon as materials and manpower permit.

Public utility companies who have standardized on Kleins have found the high quality and long life of tools and equipment they purchased in the past are standing them in good stead in these times when the demand of our fighting forces for pliers, belts, straps, climbers and grips mean that fewer are available for use on the home front.

Increased production has helped fill this need and as soon as war conditions permit, this increased production will again serve you in your big peacetime job.

In your plans for the future, be sure to include Klein pliers and other equipment.

ASK YOUR SUPPLIER

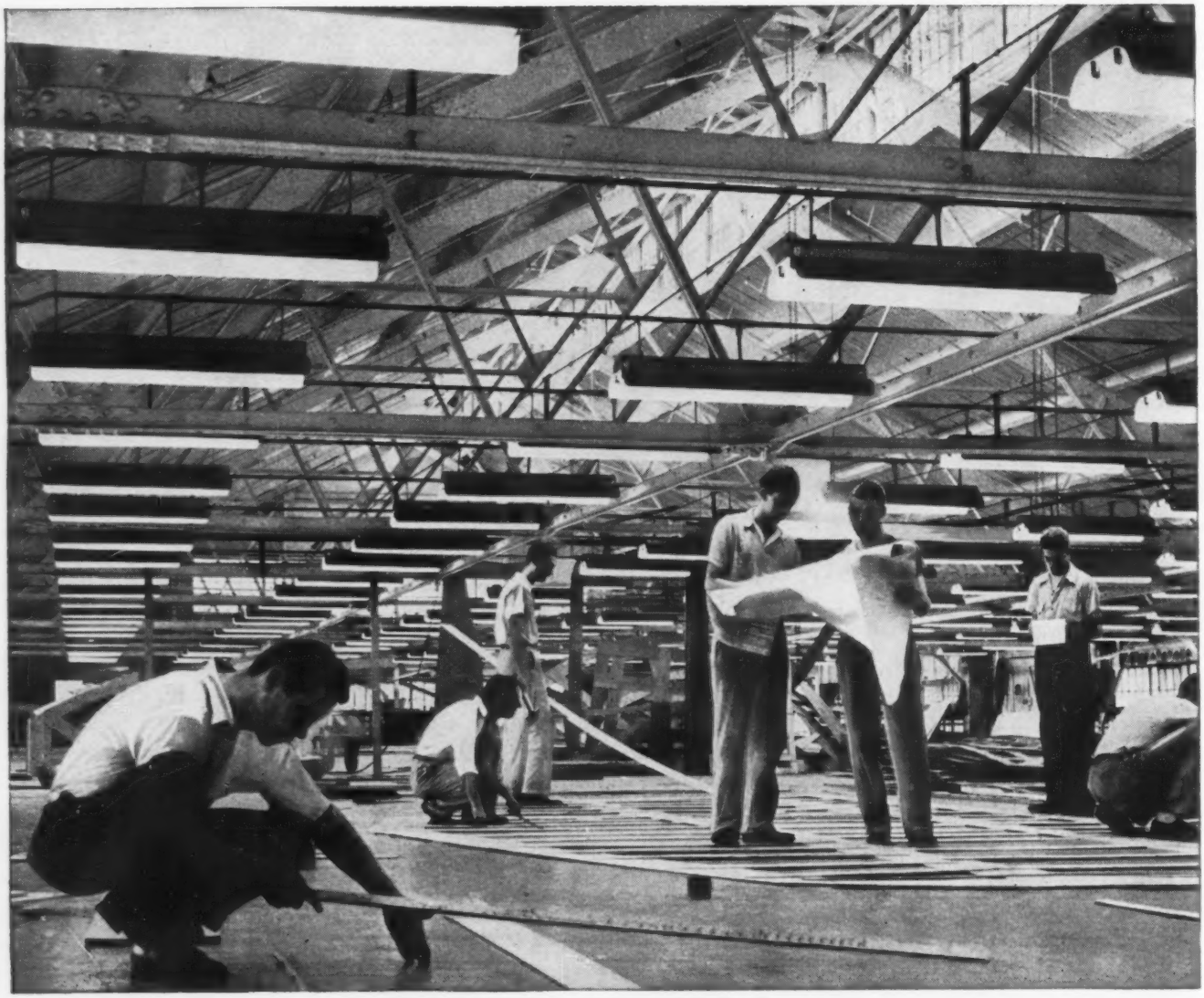
Foreign Distributor:
International Standard Electric Corp., New York

This book on the care and safe use of tools will be sent on request.

Since 1857

Mathias KLEIN & Sons
Established 1857 — Chicago, Ill., U.S.A.
3200 BELMONT AVENUE, CHICAGO 18, ILLINOIS

200 ACRES OF



Westinghouse

MAZDA LAMPS FOR SEE-ABILITY

LET'S ALL KEEP BACKING THE ATTACK . . . BUY MORE WAR BONDS!

Enjoy the Westinghouse radio program with John Charles Thomas—NBC, Sunday, 2:30 p.m., E.W.T.

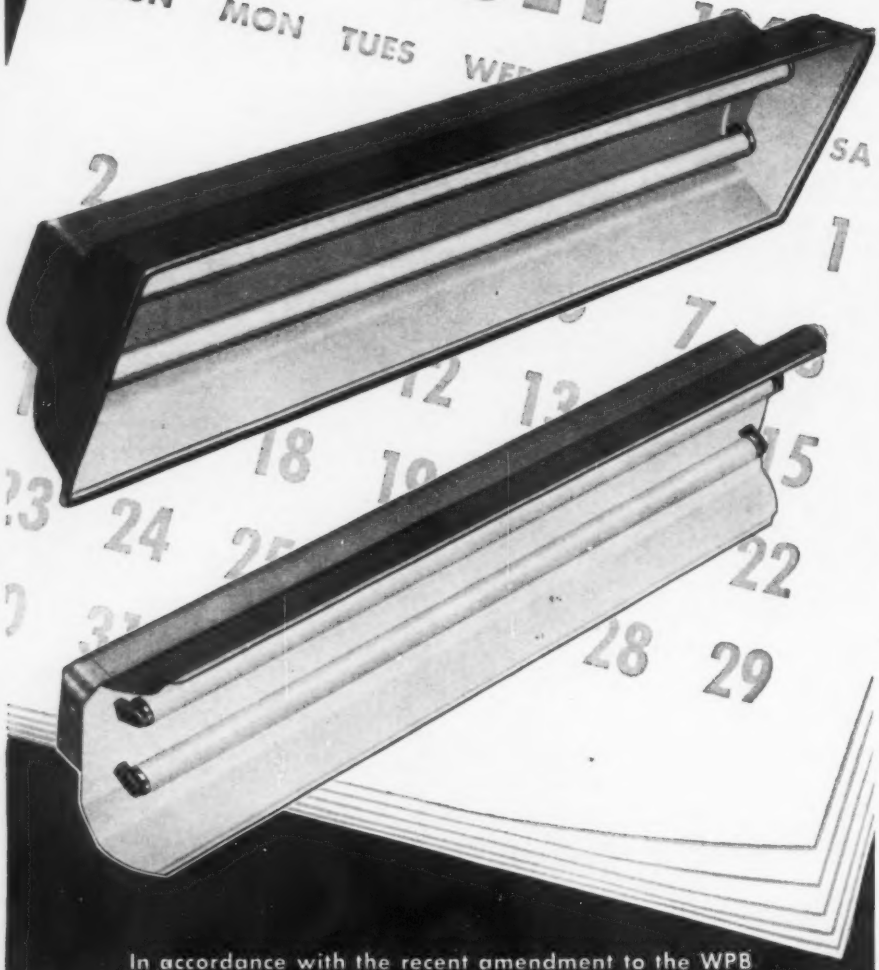
BLUEPRINTS TO CHECK

See-ability, made possible *by today's high-efficiency Westinghouse Mazda Lamps, is helping build the greatest fleet in history. In one shipyard alone, draftsmen and engineers must work with more than 200 acres of blueprints in a single year. See-ability makes this vital eye-work easier, enables ship-building Americans to work faster and more accurately, with a minimum of fatigue. Through See-ability, efficiency is increased, output speeded, eye-strain reduced. For maximum See-ability and efficient, dependable service, be sure to recommend bright, long-lasting Westinghouse Mazda Lamps. Westinghouse Electric & Mfg. Co., Bloomfield, N. J. Plants in 25 cities . . . offices everywhere.*

Wartime lighting advances made by Westinghouse engineers will lead to higher lighting standards for postwar America, with new and better ways of using light in every kind of business, industrial, transport, commercial and home activity. Higher levels of light for schools will bring easier seeing, faster learning, better work. Light in new colors, lamps in new shapes and sizes, will offer a host of new display and merchandising opportunities to progressive stores and show rooms. Whatever your plans, be sure you take full advantage of Westinghouse lighting improvements.

Now Available

These Metal SMOOT-HOLMAN Luminaires



In accordance with the recent amendment to the WPB limitation order, we are permitted to resume the use of steel in the manufacture of Smoot-Holman fluorescent lighting fixtures. We can again offer these two popular metal luminaires, closed or open end types, on orders with proper preference ratings.

Write for new supplementary catalog number 23

SMOOT-HOLMAN COMPANY

INGLEWOOD, CALIFORNIA

Offices in Principal Western Cities — Branch Warehouse in San Francisco

Relay (720)

R. W. Cramer Co. is manufacturing a two-circuit time delay relay, which it claims will provide a definitely varied operation of one circuit in relation to the second circuit. It is arranged for surface mounting for either front or rear connections and is said to be designed to withstand momentary shock conditions.

Circuit Tester (721)

Roller-Smith Co. has a light weight pocket type tester to determine resistance of an electrical circuit, with the scale reading directly in ohms. It is available in a range from 0 to 10,000 ohms and with two ranges: 0 to 5,000 and 0 to 50,000 ohms. This instrument measures 4½ x 3 x 1½ in. and weighs 19 oz.

Magnetic Brake (722)

Although not yet commercially available, a magnetic brake which will, in less than six revolutions, stop a ⅛-hp. motor traveling at 16,000 rpm. has been developed by a General Electric engineer. According to the company announcement, the brake is expected to have wide use in equipment for the armed services.

Infrared Lamp (723)

Wabash Appliance Corp., has developed for its infrared heat lamps a tungsten filament, which it claims will burn at a lower color temperature, reducing spectral glare, and will increase the radiant energy output. Elimination of cold spots and longer life are other claims made for the new lamp.

Calculator (724)

A calculator for determining welding preheating and interpass temperatures of steels where preheating is required has been designed by the Lincoln Electric Co. The calculator is 6¼ in. in diameter and consists of four movable cardboard sections.

Current Transformer (725)

Standard Transformer Co. has a new model current transformer in three ratios, 200/5, 400/5 and 600/5 amp. insulated for circuits not to exceed 1,000 volts and, according to the announcement, capable of high accuracies on burdens up to 25 volt amp.

Your Peacetime Profits may be Measured in *Kilowatts!*

Your competitors are realizing today that there's many a potential dollar of postwar profits hidden in proper power distribution within their plants. In line with their efforts to cut costs in every direction, they are looking twice at old systems of power distribution, considering ways to make electricity available more dependably, efficiently, and economically to all the places where it will do its work.

Right in your town are men who will help you plan along the same line. Let them start now. You'll be glad you did—later.

Another Way Your Power Company's Engineers Can Help Cut Postwar Costs

YOUR POWER COMPANY'S power engineers know the latest in plant distribution. In fact, utilities themselves have lived through many of the problems you will encounter for the first time, if you plan to change to a more modern distribution system. They have worked these problems out, and have the solutions ready for your use . . . as well as the figures on what better distribution can mean in dollars and cents.

When the time comes to modernize your distribution, remember Roebling as *wire specialists*, a logical source of supply for the wires and cables you'll need for all modernization: better lighting . . . air conditioning . . . power distribution . . . full utilization of the electric and electronic cost-cutters the war has produced.

JOHN A. ROEBLING'S SONS COMPANY
OF CALIFORNIA
San Francisco • Los Angeles • Seattle • Portland

ROEBLING
PACEMAKER IN WIRE PROUCTS

Wire Rope and Strand • Fittings • Cold Rolled Strip • Aircord, Swaged Terminals and Assemblies • Round and Shaped Wire Wire Cloth and Netting • High and Low Carbon Acid and Basic Open Hearth Steels Suspension Bridges and Cables • Electrical Wires and Cables • Aerial Wire Rope Systems

40,000 INDUSTRIAL EXECUTIVES ARE REFERRED TO THEIR LOCAL POWER ENGINEERS for help in planning better postwar use of electricity, by this current advertising of Roebling Electric Wires and Cables in "Mill & Factory" and "Purchasing". We hope that this advertising will result in desirable postwar loads for your company.

Full size reprints of the advertisement available on request

Patents Pending

As every lineman knows, there have been two ways to make serves on dead ends of multiple zinc-coated strand on telephone and power lines.

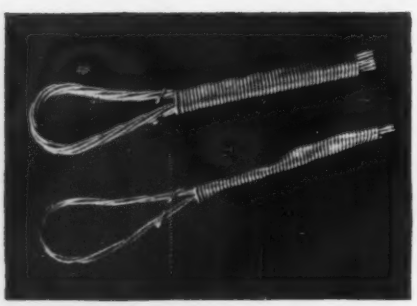
One method is the familiar "breakdown serve,"—a laborious job which, when made with pliers, tends to invite corrosion by damaging the zinc coating of the wires. The other way is the use of clamps.

Now Bethlehem's research engineers have developed a handy serving tool which provides a brand-new technique for making serves, on bethanized strand or Ruralductor. With the tool, which is a simple, one-piece winding appliance, any lineman can quickly master the technique—called the "dead-end coil" method because it uses a 10-ft. coil of dead-end wire to make the serve.

The new-type serve is a strong, tight wrapping of 11-gauge bethanized dead-end wire, given fifty turns around the ends of the loop. The wire is easily applied: the lineman simply engages it between the two "fingers" projecting from the tool, which hold it under steady tension while the tool is rotated.

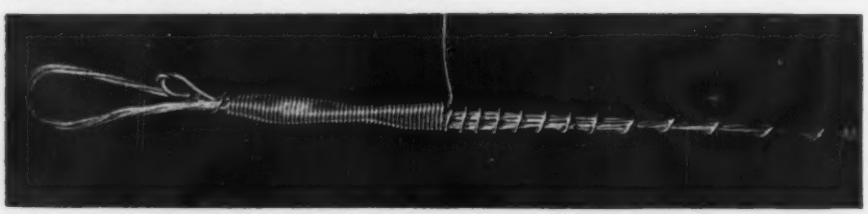
The ductile, tight zinc coating of bethanized wire or strand is not displaced to any harmful extent by the smooth, hard "fingers"—and tests show that the serve holds beyond the useful strength of the strand. However, the technique is recommended for use only on bethanized strand, as the holding power of the dead end is not always as reliable with other types of coatings.

For your next installation, give some thought to the advantages of bethanized strand, plus the Bethlehem serving tool. For complete information, get in touch with the nearest Bethlehem representative, or write direct to Bethlehem Steel Company, Bethlehem, Pa.



SERVES ON 3- AND 7-WIRE STRAND—These dead ends were quickly made with the new Bethlehem serving tool. The wire used is 11-gauge bethanized. The tool is suitable for the commonly used sizes and grades of strand, in class A, B and C coatings.

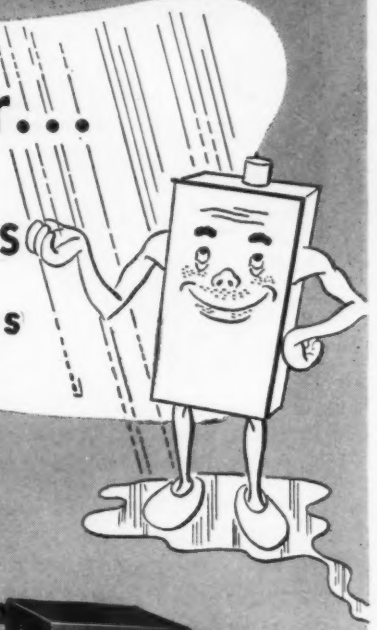
VIBRATION-DAMPENING ASSEMBLY—For this vibration-dampening dead-end assembly on three-wire Ruralductor, jumper wire of soft steel is laid in the valley between strands, and fifty turns of dead-end bethanized wire applied with the tool. The jumper wire is thus firmly secured, without interfering with the holding power of the dead end, and with good electrical contact. The individual strand wires are fanned back below the serve, and cut to lengths of 1 in., 5 in., and 10 in., respectively. The remaining dead-end wire is wrapped by hand. This provides an effective vibration-dampener.

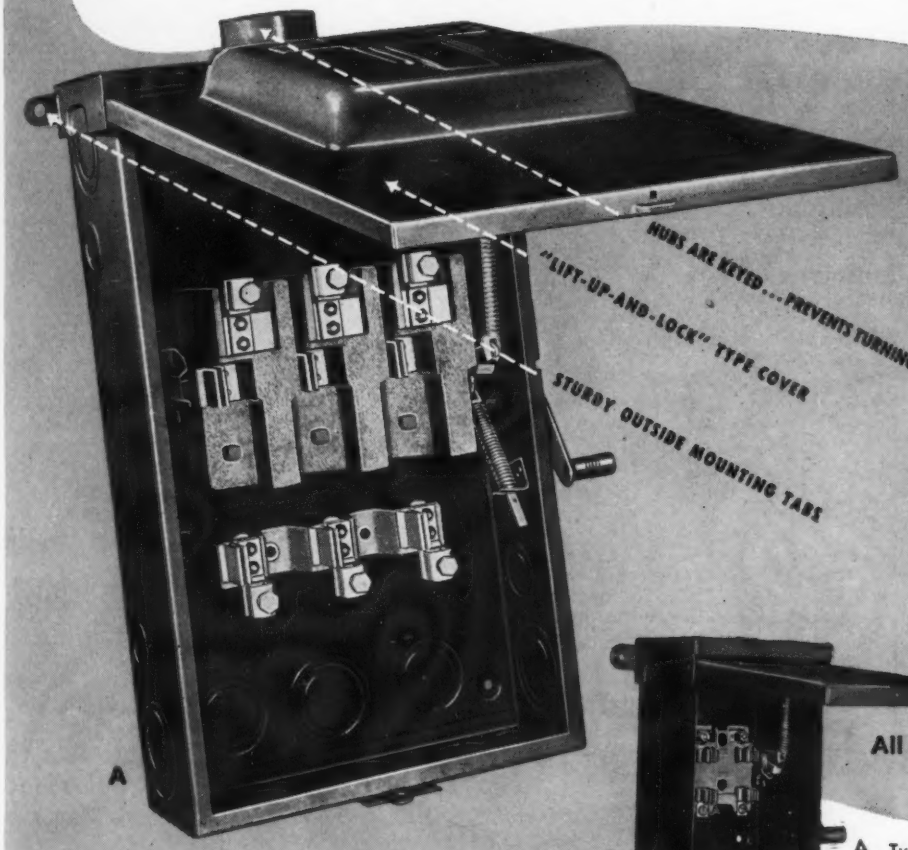


★ BETHLEHEM STEEL ★

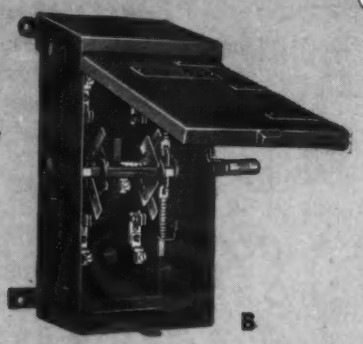
let it rain...let it pour...

Federal RAIN-TIGHT SWITCHES eliminate moisture worries

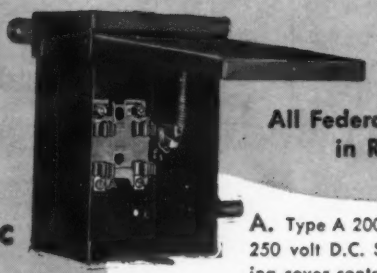




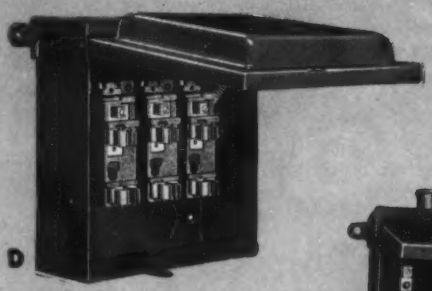
A



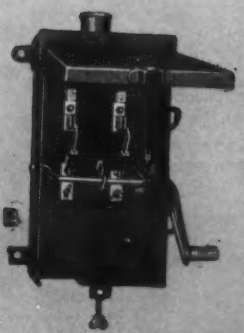
B



C



D



E

All Federal Switches are available in Raintight Enclosures

A. Type A 200 amperes 3 pole 230 volt A.C.—250 volt D.C. Switch. Equipped with interlocking cover control.

B. Double-throw 60 amperes 250 volt D.C. Safety Switch.

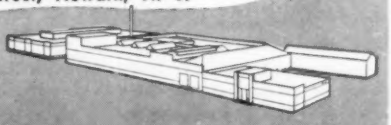
C. Type C 30 amperes 2 pole cartridge fuse 230 volt A.C.—250 volt D.C. Raintight Switch.

D. Type C 60 amperes 330 volt A.C.—250 volt D.C. All type C concealed arc switches are equipped with shock resistant Hemite bases.

E. Type C 100 amperes, 2 pole, 250 volt D.C., no fuse Raintight Switch.

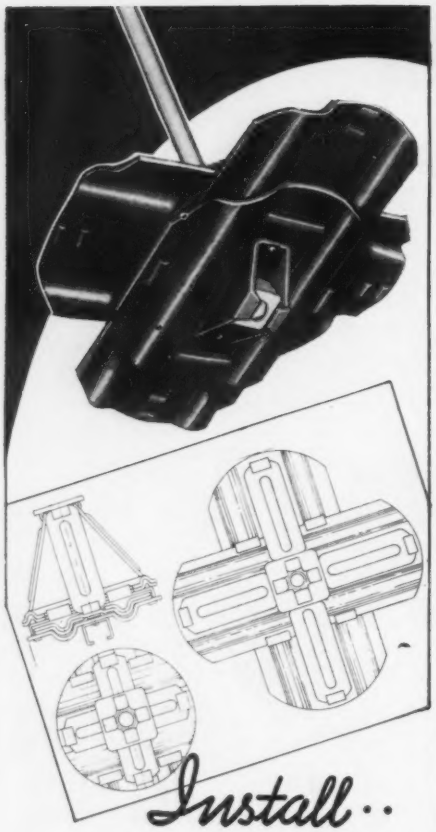
Federal

ELECTRIC PRODUCTS COMPANY
50 Paris Street, Newark, N. J.



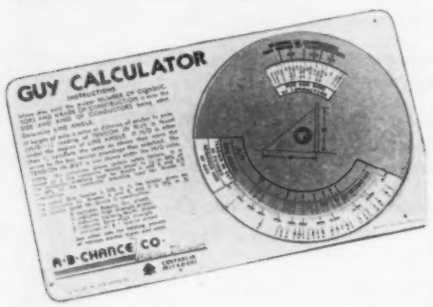
CIRCUIT BREAKERS • PANELBOARDS • SWITCHBOARDS • SAFETY SWITCHES

3671



CHANCE STEEL ANCHORS for Time Proven HOLDING POWER

When expanding anchors are the type to use, here is the anchor for the job—a dependable product proven by years of actual use by thousands of users. Chance Steel Expanding Anchors are being extensively used by our armed forces for dependable support of vital power and communication lines. They have long been the choice of many utility engineers and construction men because: They arrive intact. You can beat them with a sledge but the arms won't come loose. The blades expand in opposite directions to equalize the strain. The nut retainer aids installation. There is no questionable "half way" expansion and no side twisting.



Get this guide to better anchoring . . .

To get the most out of anchoring with the least amount of waste, use this guy calculator—yours for the asking.

A·B·CHANCE CO. CENTRALIA MISSOURI

BULLETINS

data books, etc.

Electrical Symbols (726)

I-T-E Circuit Breaker Co. has issued a new chart of electrical symbols for power, control and measurement, both in one line and complete wiring diagrams. The symbols chart is in blueprint style. More than 500 symbols and switch sequence tabulations, with more than 100 for motors and other rotating machines, are included.

Adhesives (727)

B. F. Goodrich Co. has published a catalogue section on its line of adhesives. Service requirements and classification of the various adhesives is discussed and types are listed. Instructions on application and data on the company's standard containers are included, with approximate shipping weights.

Insulation Tester (728)

Herman H. Sticht Co., describes its model B-5 megohmer, battery-vibrator type insulation tester in a recent bulletin. Given are the triple color scale, various models available and a chapter on the value of periodic insulation resistance measurements as recorded on megographs.

Duct (729)

BullDog Electric Products Co. has prepared a 12-page bulletin on its BUStribution Duct of the ventilated low-reactance type for feeder circuits up to 2,000 amp.

Cold Cathode (730)

General Luminescent Corp. has prepared a new booklet, listing 40 facts about its Colovolt cold cathode lamp.

Water Cooling (731)

"Fundamentals of Water Cooling" is the title of a booklet released recently by the Marley Co. and containing a brief review of basic theory in water cooling engineering, followed by non-technical discussions of various aspects of cooling tower design and construction. Illustrated by diagrams and photographs.

Modern Kitchens (732)

Mullins Mfg Corp is distributing two booklets devoted to kitchen modernization One, "Get Acquainted with Your Kitchen," is a wartime consumer bulletin, which tells its story with text and pictures. The other, "Get Acquainted with Your Kitchen Business," is a dealer publication.

Catalogue (733)

A condensed catalogue giving basic information, list prices and dimensions on safety switches, light and power panelboards, switchboards, circuit breaker panelboards, Kbl-Duct and BUStribution Duct has been issued by BullDog Electric Products Co.

Lubricating (734)

A recent bulletin of the Farval Corp. explains the company's system for sending lubricant under pressure from a central pumping unit to every bearing on a machine.

Disconnect Switches (735)

Delta-Star Electric Co., in a new booklet, describes two- to five-thousand ampere, single-pole, single-throw, stick operated, straight current path, front connected indoor disconnecting switches, in voltates from 7,500 to 23,000 and ampere capacities from 2,000 to 5,000.

Gravity Feed Oilers (736)

Trico Fuse Mfg. Co. is distributing a data sheet on gravity feed oilers, with clear reinforced plastic bottles. This type reservoir is said to be 50% lighter in weight. Standard and dust-proof models are listed.

Cable Terminators (737)

Sealed type single- and three-conductor equipment cable terminators are described in a publication issued recently by Delta-Star Electric Co. Construction details, dimensions and electrical characteristics are included.

ELECTRICAL WEST, 68 Post St., San Francisco, 4, California

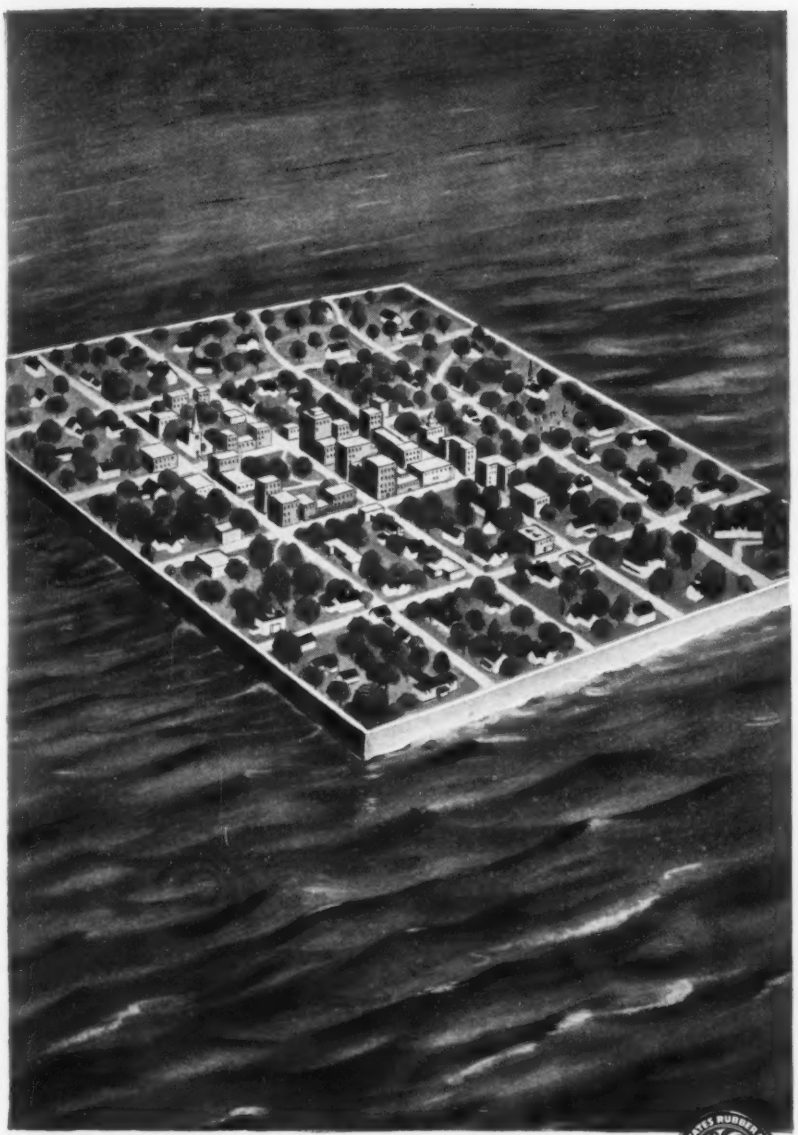
Please send me information about following CIRCLED items:

700 701 702 703 704 705 706 707 708 709 710 711
712 713 714 715 716 717 718 719 720 721 722 723
724 725 726 727 728 729 730 731 732 733 734 735
736 737

Name..... Company*..... Title*.....

Address.....

* Please include your company's name and your position, as we cannot ask manufacturers to furnish literature unless you do.



WIRING A FLOATING CITY

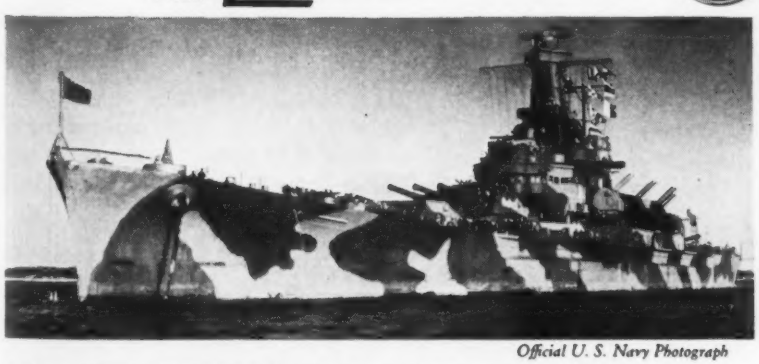
A super-dreadnaught at sea is a self-contained, highly co-ordinated community. It takes close to a million feet of insulated wires and cables for the amazing network connecting the many telephones, head-sets and loudspeakers.

Insulations of special compounds developed by U. S. Rubber scientists provide effective protection for communication and power lines. They retain their resiliency under continued vibration and the shattering shock of big guns firing.

Among these is Laytex, a compound of purified ingredients. Applied to the wire by a unique process of dipping and drying followed by vulcanizing, it forms a homogeneous sheath around perfectly centered conductors.

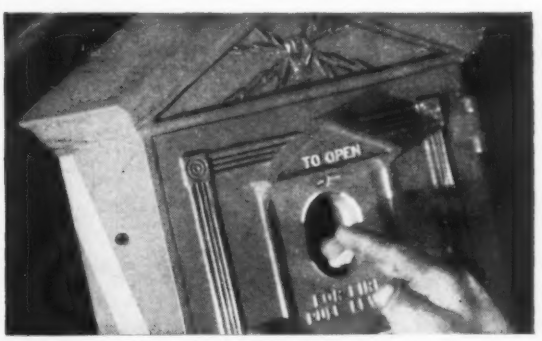
U.S. Laytex Wires and Cables now in combat use the world over will have a no-less important function in the communities of the future.

Laytex WIRES AND CABLES — *SERVING THROUGH SCIENCE*



Official U. S. Navy Photograph

188 MILES OF WIRE: That's what the communications system alone on the latest super-dreadnaught requires. Laytex Wires and Cables—slender, yet tough because of their special insulation—are in use on such systems as they are elsewhere with our Armed Forces around the world. Other types of U. S. Laytex Wires and Cables are used for gun control, lighting and power.



LAYTEX WILL COME HOME: The entire output of Laytex Wires and Cables is still going to the Armed Forces. The day is steadily drawing nearer when manufacture of these wires and cables for Buildings, Police and Fire Alarms, Communications, Signalling, Power and Control will be resumed.

Listen to the Philharmonic-Symphony program over the CBS network Sunday afternoon, 3:00 to 4:30 E.W.T. Carl Van Doren and a guest star present an interlude of historical significance.

UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, ROCKEFELLER CENTER, NEW YORK 20, N. Y. • *In Canada:* DOMINION RUBBER CO., LTD.

ELECTRA'S HUSBAND

Father's Ethnic Group

"GIVE me some help," Electra said, as she was seated at the desk in the living room one evening recently. She is usually more than self-sufficient, so it was evident that something had her stumped.

"Name the word and I'll spell it for you," I muttered, for the story I was reading was nearing its climax. Besides I knew that Electra was a notoriously bad speller.

"It's not a word. I want to know where your father was born," she said.

"I don't know, and anyway what's the difference," I said, trying to shut her off.

"But I want it for this questionnaire," she continued. "Moreover, I want to know what ethnic group he belonged to, if he belonged to any."

"You what?" I asked, dropping my book. "Say, what are you trying to do, spoof me? What have you got anyway?"

"Oh, it's a government questionnaire," she replied, innocently. "You remember Fulton Lewis told about it on the radio a month ago. Well, I've been trying to get one and I finally did."

"But that was about farmers," I said. "Why should you bother about it?"

"Well, you always are telling me how we are going to retire on a farm of our own some day," she replied. "And besides, you had such good luck with your victory garden."

It was obvious that she was needling me for some purpose. But I had missed the Fulton Lewis broadcast so I was curious about the questionnaire. You remember the facts—the Bureau of Agricultural Economics of the Department of Agriculture drew it up for use in one of the studies in connection with the Central Valley Project in California. The project is even now the center of a heated argument over the size of farms to be permitted—160 acres or less, or the large units, highly mechanized, which have been able to contribute so effectively to the food supply for war. And the land argument is entirely distinct from the question of disposition of the electric power to be generated.

"My father was born in Massachusetts and I guess you would call him early American," I said.

"Oh no you wouldn't," Electra interposed. "That would make him an Indian."

"Go on with your questions," I said.

"Year of arrival in community. Last previous residence. Number of California towns you have lived in since 1935. Number of towns outside of California. Give acreage of three major crops. Total acreage. Tenure. Type of farm," Electra rattled off. "How many separate crops have you had since 1935? What do you consider your home town? Does this neighborhood go by a special name?"

"Stop," I interrupted. "It's none of their damned business . . . ."

"Oh those are some of the easy questions," Electra said. "Listen to some more. They want all of the details on the church and/or Sunday school membership of each member of the family. Did any member of your family change denominations upon coming to this town or since you have been here? If so, what was the former affiliation? Do you attend church more or less frequently than before the change? What clubs does each member of the family belong to? Where do they meet? How often do they attend? Offices held?"

"Wow, what a nosey bunch," I said. "Now why would they want to know things such as that? I'll bet the Gestapo didn't have any more information on the people in Germany. Do you think . . ."

"I think a lot of things, and so will you when you hear the rest," Electra interposed. "Figure out the why's and wherefore's of the following: What informal activities did members of your family participate in and give the number of participations per year for each family member. Then they list school functions, card parties, picnics, dances, movies and community affairs. They want to know if you have a small group of close friends, how many there are, where they live and what they do. Do they all belong to one church or club and what one?"

"The lousy, snooping bunch of . . . ," I raged.

"Keep calm," Electra reiterated. "they haven't begun to get personal yet. They want you to list the families whom you visited regularly in 1943 and in 1940, if different, and whom you consider your more intimate friends. They want the name, occupation or tenure, whether they were related, the ethnic group to which they belonged, the number of times you were at their houses and the number of times they returned the visit. Also whether you do more or less visiting than in 1940 and why."

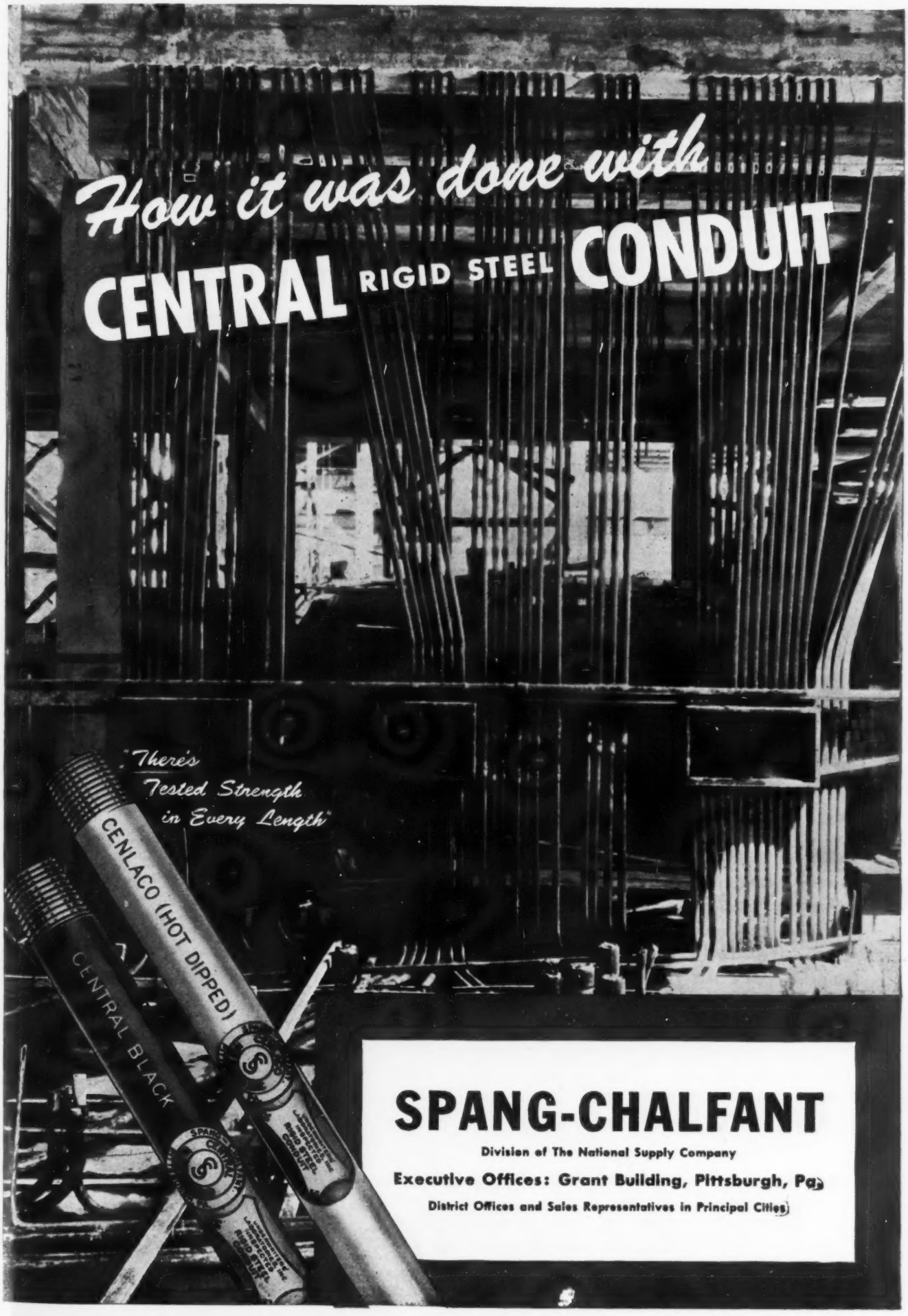
"Did you ever hear of gas rationing?" I asked. "Lord, I know a lot of California farmers that would tell them off if they pulled such stuff as this. But I still can't figure out what this has to do with water in the Sacramento or San Joaquin valleys, or with anything else for that matter."

"They know about gasoline because in the next lot of questions about 'economic participation' they ask where you bought things before rationing was instituted," Electra continued. "They want to know from whom and where you got your groceries, clothes, gas and oil, farm machinery, feed and seed; where you did your banking, who your doctor is, what movies you attend and what newspapers you read. Then they ask where you go to hire labor and where to look for work. Finally, after inquiring as to whether you have a garden, raise chickens and keep a cow, they want to know what your annual income is.

Anger at the silliness and futility of a study of this kind began to be replaced by a different feeling. It wasn't fear, and it was more than suspicion.

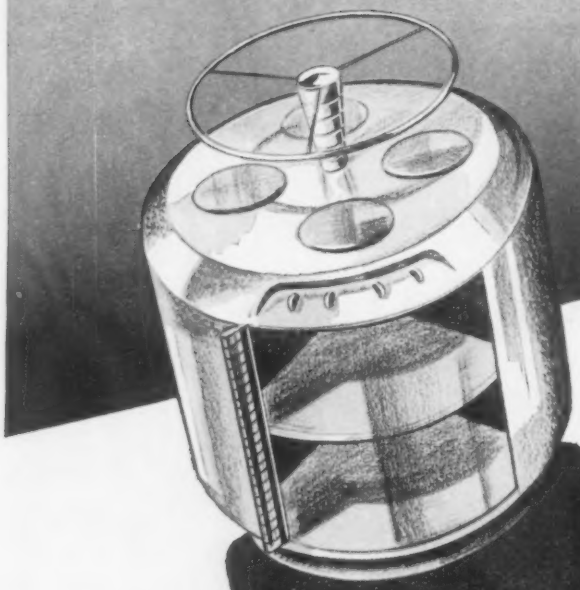
"You know this thing has a sinister aspect," I said to Electra. "Why should a reputedly democratic government want to know all these intimate and, from their standpoint, irrelevant things about some of its people? It doesn't. But a lot of little bureaucratic busybodies, whose motives are suspect and whose aim seems to be pretty obvious, do want to know them. They can put pressure here, or appeal to a set of emotions there or apply heat through some group—all to no good American purpose."

"Wait a minute," Electra interrupted. "I didn't finish. Wouldn't a housewife like to see how the interviewer who fills in the questionnaire rates her? They want to know a lot about the house, inside and out, whether it's clean or dirty, well painted or scaling paint. Let them go ahead and make the women mad. We've been accused of electing 'em. Well, we can throw them out too. They are on their way!"


How it was done with
CENTRAL RIGID STEEL CONDUIT
"There's
Tested Strength
in Every Length"
CENLACO (HOT DIPPED)
CENTRAL BLACK
SPANG-CHALFANT
Division of The National Supply Company
Executive Offices: Grant Building, Pittsburgh, Pa.
District Offices and Sales Representatives in Principal Cities

ELECTROMASTER

. . . THE RANGE WITH A FUTURE



One of the "Electric Ranges for Tomorrow" sketched for Electromaster by the noted industrial designer, George W. Walker

ELECTROMASTER MODEL 16-1

WHETHER TOMORROW'S ELECTRIC RANGE be futuristic or conventional, if built by Electromaster it will offer outstanding advantages. Standard equipment for Electromaster Model 16-1 includes a 6-quart Vita-Miser cooker, oven control clock with interval timer, signal light for each unit, twin-unit oven, warming drawer, and two spacious utensil drawers. It provides beauty with a purpose—attractive appearance combined with maximum utility.

Electromaster, busy in war production, is also hard at work planning extensive improvements for electric ranges. New materials and recent technical developments will provide greater visibility of cooking operations, ease of cleaning, foolproof controls, and other safety and convenience features. In the future, as in the past, Electromaster's straight line production methods will turn out the finest in electric cooking equipment.

Sales territories are available in certain localities.

ARMY E NAVY

Electromaster

DETROIT 31, MICHIGAN

ELECTRICAL WEST

JULY, 1944
VOL. 93 NO. 1

Electrical Industry Postwar Employment Opportunities

PCEA Planning Committee conducts survey and analysis which show 29% deficit of employees in 194X to provide work for returning war veterans and new people as well

HE was a young Marine captain —four stars on his Asiatic-Pacific service ribbon, with a Navy Silver Star medal and a presidential unit citation besides. He had been invalided out of the service because Marine officers are either fit for combat duty or retired; there is no limited service for them. His story will be typical of countless other returning service men—out of school, into the Marines, into the fighting, into a hospital and back into civilian life. Now he was looking for a job. No, he wanted more than that—a place in business or industry with a future, with opportunity for advancement and with security.

"I've read a lot about your electrical business," he said. "People think it has a great future—new things and new ideas, a lot of them stemming from the war. How about it? Is there a place in it for a guy like me? I haven't had any business experience, but I know men and I can handle people."

That's a hypothetical case (or is it?) but it sets forth the problem of all business and industry in the immediate postwar era—to provide jobs for the men and women who left positions to go into the service and the millions of others who went directly from school to war. That's the fundamental task for private enterprise in reconverting from war work to peacetime production—to transfer millions of men and women from the armed services and from war plants into a peaceful civilian life without upsetting our national economy.

To obtain some gauge as to the electrical industry's ability to contribute to industry's reservoir of postwar employment, the Planning Committee of the Pacific Coast Electrical Assn. set out to survey employment potentials in Arizona, Nevada, and California. The resulting facts offer conclusive proof that the electrical industry will more than fulfill its obligation. A composite recapitulation of the returns, which cover electric utilities, manufacturers, wholesalers and contractors who employed 28,218 men and women in peacetime, shows there will be available in 194X, the year peace is won, a total of 8,137 jobs. Of this number, 4,546 places must be held for the men and women now in the service, if they want their old jobs back. The remaining 3,591 represent net *new* postwar job opportunities. Details are on Table I, p. 46.

Examination of the data shows that the greatest deficit will be in the production, operating and maintenance categories. It might have been expected that the sales classification would have shown the greatest deficit. Such might have been the case had it been possible to include information on retailers in the survey. However preliminary study showed that this industry classification was not yet ready to express its postwar plans in terms of estimated employees required. This same problem confronted the electrical contracting group, but a sufficient number furnished data to permit a compilation.

Information on the postwar employment status of each branch of the

EVERY AMERICAN is determined that winning the war shall come first. It goes without saying that the vital, all-out contribution of industry shall continue until victory is won. If we defer the urgent business of "winning the peace," however, until after we have won the war, the peace may be lost. Once peace comes, business must be ready to do its part quickly in the race for high levels of production. The desire for goods will be in the people's hearts, the money in their hands, but we must prepare for production beyond any boom or against another depression. America must plan NOW to put the returning men of the armed forces and the war workers to work—to keep them at work in useful jobs, with opportunity for advancement before unemployment brings disillusionment, and demands for government make-work programs. The U. S. Department of Commerce economists estimate that there will be an available civilian labor force of approximately 57,500,000 persons by 1946. Naturally many of these workers will find jobs in agriculture, government and other non-industrial occupations. Business, however, must be prepared to make its maximum contribution towards hiring millions of those comprised in this great labor force. If America's individual business enterprisers have planned boldly and have the courage to act boldly when peace comes, then industry's wheels can begin to run—IN TIME.—Paul G. Hoffman, chairman, The Committee for Economic Development.

Table I—Postwar Employment Analysis for the Electrical Industry in Arizona, California and Nevada

Classification	Employees In Armed Forces	Average Number of Employees on Pay Roll 1940	Employees Recalled from Retirement	Total Now Employed			Estimated Number of Postwar Employees			Postwar Estimate Surplus or Deficit of Employees			% of Employees Change 1940-194X
				Men	Women	Total	Men	Women	Total	Men	Women	Total	
1. Management	29	593	24	555	17	572	652	14	666	−97	+3	−94	−15.8
2. Technical and Professional	286	1,595	9	1,315	29	1,344	1,814	20	1,834	−499	+9	−490	−31.8
3. Sales	158	1,339	1	722	82	804	1,523	112	1,635	−801	−30	−831	−62
4. Clerical and Routine	978	7,281	50	2,905	3,472	6,377	4,119	3,167	7,286	−1,214	+305	−909	−12.2
5. Production, Operating and Maintenance													
A. Supervisory	78	2,053	9	1,976	26	2,002	2,407	28	2,435	−431	−2	−433	−21.2
B. Skilled	739	7,237	29	6,533	86	6,619	9,079	84	9,163	−2,546	+2	−2,544	−35.0
C. Semi-skilled	1,190	5,218	22	3,859	804	4,663	5,789	537	6,326	−1,930	+267	−1,663	−34
D. Non-skilled	1,638	2,902	20	1,804	515	2,319	3,242	250	3,492	−1,438	+265	−1,173	−41.5
TOTALS	4,546	28,218	164	19,669	5,031	24,700	28,625	4,212	32,837	−8,956	+819	−8,137	−29

Table II—Postwar Employment Analysis for Electric Utilities in Arizona, California and Nevada

Classification	Employees In Armed Forces	Average Number of Employees on Pay Roll 1940	Employees Recalled from Retirement	Total Now Employed			Estimated Number of Postwar Employees			Postwar Estimate Surplus or Deficit of Employees			% of Employees Change 1940-194X
				Men	Women	Total	Men	Women	Total	Men	Women	Total	
1. Management	17	436	24	391	9	400	472	9	481	−81	.....	−81	−18.3
2. Technical and Professional	256	1,445	7	1,065	22	1,087	1,553	18	1,571	−488	+4	−484	−33.5
3. Sales	81	874	...	391	41	432	972	77	1,049	−581	−36	−617	−71
4. Clerical and Routine	829	6,498	50	2,571	2,789	5,360	3,678	2,518	6,196	−1,107	+271	−836	−12.8
5. Production Operating and Maintenance													
A. Supervisory	58	1,882	9	1,682	19	1,701	2,137	21	2,158	−455	−2	−457	−25.4
B. Skilled	652	6,783	29	5,734	57	5,791	8,286	58	8,344	−2,552	−1	−2,553	−37.5
C. Semi-skilled	813	4,323	22	3,191	130	3,321	4,889	136	5,025	−1,698	−6	−1,704	−39.5
D. Non-skilled	878	2,392	19	1,577	72	1,649	2,896	59	2,955	−1,319	+13	−1,306	−55
TOTALS	3,584	24,633	160	16,602	3,139	19,741	24,883	2,896	27,779	−8,281	+243	−8,038	−32.8

Table III—Postwar Employment Analysis for Electrical Manufacturers in Arizona, California and Nevada

Classification	Employees In Armed Forces	Average Number of Employees on Pay Roll 1940	Employees Recalled from Retirement	Total Now Employed			Estimated Number of Postwar Employees			Postwar Estimate Surplus or Deficit of Employees			% of Employees Change 1940-194X
				Men	Women	Total	Men	Women	Total	Men	Women	Total	
1. Management	8	111	...	114	6	120	121	4	125	−7	+2	−5	−4.5
2. Technical and Professional	25	119	2	222	7	229	218	2	220	+4	+5	+9	+7.5
3. Sales	44	282	1	205	37	242	313	20	333	−108	+17	−91	−32.4
4. Clerical and Routine	81	449	...	174	466	640	228	421	649	−54	+45	−9	−2.1
5. Production Operating and Maintenance													
A. Supervisory	15	100	...	216	7	223	175	7	182	+41	.....	+41	+41
B. Skilled	87	243	...	396	24	420	431	24	455	−35	.....	−35	−14.2
C. Semi-skilled	319	742	...	553	653	1,206	728	389	1,117	−175	+264	+89	+12
D. Non-skilled	152	488	1	201	374	575	310	190	500	−109	+184	+75	+15.6
TOTALS	731	2,534	4	2,081	1,574	3,655	2,524	1,057	3,581	−443	+517	+74	+2.8

Table IV—Postwar Employment Analysis for Electrical Wholesalers in Arizona, California and Nebraska

Classification	Employees In Armed Forces	Average Number of Employees on Pay Roll 1940	Employees Recalled from Retirement	Total Now Employed			Estimated Number of Postwar Employees			Postwar Estimate Surplus or Deficit of Employees			% of Employees Change 1940-194X
				Men	Women	Total	Men	Women	Total	Men	Women	Total	
1. Management	2	31		33	1	34	36		36	−3	+1	−2	−6.5
2. Technical and Professional	2	11		10		10	20		20	−10		−10	−91
3. Sales	31	165		116	2	118	209	8	217	−93	−6	−99	−60
4. Clerical and Routine	63	291		135	181	316	191	188	379	−56	−7	−63	−21.7
5. Production Operating and Maintenance													
A. Supervisory	2	21		18		18	29		29	−11		−11	−52.5
B. Skilled	8	26		25		25	35		35	−10		−10	−38.5
C. Semi-skilled	15	89		52	3	55	101	2	103	−49	+1	−48	−54
D. Non-skilled	2	5		4	67	71	9		9	−5	+67	+62	+800
TOTALS	125	639		393	254	647	630	198	828	−237	+56	−181	−28.4

Table V—Postwar Employment Analysis for Electrical Contractors in Arizona, California and Nevada

Classification	Employees In Armed Forces	Average Number of Employees on Pay Roll 1940	Employees Recalled from Retirement	Total Now Employed			Estimated Number of Postwar Employees			Postwar Estimate Surplus or Deficit of Employees			% of Employees Change 1940-194X
				Men	Women	Total	Men	Women	Total	Men	Women	Total	
1. Management	2	15		17	1	18	23	1	24	−6		−6	−40
2. Technical and Professional	3	20		18		18	23		23	−5		−5	−25
3. Sales	2	18		10	2	12	29	7	36	−19	−5	−24	−136
4. Clerical and Routine	5	43		25	36	61	22	40	62	+3	−4	−1	−2.4
5. Production, Operating and Maintenance													
A. Supervisory	3	50		60		60	66		66	−6		−6	−12
B. Skilled	42	185		378	5	383	327	2	329	+51	+3	+54	+29.5
C. Semi-skilled	43	64		63	18	81	71	10	81	−8	+8		
D. Non-skilled	6	17		22	2	24	27	1	28	−5	+1	−4	−29.5
TOTALS	106	412		593	64	657	588	61	649	+5	+3	+8	+1.7

industry is presented in Tables II, III, IV and V. Table II covers the utilities, both private and municipal, in the three states and the data are representative of organizations serving 93.5% of the electric meters in the region. The stringent manpower situation brought on by the war is reflected in the decrease in total employees between 1940 and the date of the survey, April, 1944, from 24,633 to 19,741. Not all of this drop was due to armed force withdrawals since only 3,584 were reported to be in uniform. The degree to which women have been utilized to replace men is partially indicated by the fact that an estimated surplus of 243 women will exist in 194X.

The data for manufacturers contained in Table III cover only those organizations now engaged in electrical goods production, together with a fair proportion of those organizations which only maintain a sales and service force in the three states. No attempt was made to canvass organizations engaged in non-electrical war production at the present time which might engage in electrical goods production in the postwar era. There have been many rumors of such possibilities but no tangible announcements of such intentions on the part of aircraft or other war goods producers. As a matter of fact, this study shows that there will be a surplus of production workers among this group which more than offsets an estimated deficit of sales personnel. This tabulation shows also the degree to which women have been used to take the place of men in production operations.

How the war has affected the wholesaler classification is shown in Table IV, which covers nine companies doing the largest proportion of the volume in this region. The effect of the war in expanding industrial activity in this region and the promise of greatly increased appliance markets appear to be reflected in the estimated growth from a total of 639 employees in 1940 to 828 in 194X. Here again there will be an estimated surplus of women employees, indicating the replacement which has been brought on by the war.

Electrical contractors freely admitted in furnishing the information requested that they could only offer rough estimates. Their postwar volume of busines is predicated upon so many unknown factors that they could only assume certain conditions based upon prewar levels. Building construc-

tion and modernization, industry promotions on such things as re-wiring and other factors all would affect their operations and might appreciably increase their estimates.

As was pointed out earlier, it was impossible at this time to give a picture of retailer postwar opportunities. It is possible that a separate study of this situation may be made by the committee later.

Already some of the organizations in this region have been confronted by the problem of returning service people. Experience coincides with a statement contained in *Time* magazine for June 12:

"Soldiers overseas still dream about home, corner drugstores and blueberry pie, but when they get back a lot of them may find old scenes pretty boring.

"A War Department survey last week showed that 40% of the discharged veterans being sent back to civilian life through eastern 'separation centers' do not want their old jobs back, do not even want to return to their old communities.

"On the Pacific Coast, a survey at one center showed the percentages of men looking for greener pastures to be even greater.

"Office of War Information reported that only 25% of the veterans discharged from hospitals in the last four years have returned to their old positions."

One electrical industry personnel man who has had the task of re-employing nearly 100 veterans confirms this. Men from smaller communities wanted places in the larger cities and *vice versa*. Also many expressed the desire to be shifted to a new department or to a new environment. His policy has been to put the returning service men into their old jobs in their old communities just as quickly as possible and to discuss their new wishes later.

There has been a certain amount of confusion regarding the obligations of employers and the rights of returning veterans with respect to re-employment. Policies governing the mandatory re-employment of ex-service men and women have just recently been amplified and clarified by National Selective Service Headquarters so as to leave as few questions open to disagreement as possible.

Pointing out that constitutionality of Section 8 of the Selective Training and Service Act has been upheld by a U. S. District Court and that the re-employment guarantees apply to all persons who entered active service after May 1, 1940, whether drafted or not, Draft Director Lewis B. Hershey has ruled that conscientious objectors are not eligible for the re-employment benefits.

Employers are entitled to proof that returning employees have completed their military service satisfactorily, and no discharges other than honorable or under honorable circumstances will constitute such proof. It was also emphasized that returning employees must apply for re-employment within 40 days after completion of service.

Veterans must be able to perform the jobs for which they re-apply, but employers may not set up "arbitrary or unreasonable" standards to determine qualification. In doubtful cases, Hershey has ruled, veterans are entitled to an opportunity to prove their ability.

Decision as to whether a job left by a serviceman was temporary must be determined on the circumstances of the particular case, Hershey declared. Normally, workers employed to fill the places of other workers who went into the service occupy temporary jobs and possess no re-employment rights.

Likewise, decision as to whether changed circumstances render it "impossible or unreasonable" for an employer to offer re-employment must be made on the basis of individual circumstances. "Convenience" of an employer must be distinguished from unreasonableness or impossibility, Hershey warned.

Seniority rights accumulate during military service, and the re-employment right obtains even though it causes the discharge of a non-veteran with more seniority than the veteran, Hershey has ruled. Veterans may not be required to change location of employment without consent, and back pay may be claimed by veterans who are not re-employed reasonably promptly. Once re-employed, veterans may not be discharged without cause for one year. Cause is to be determined by prevalent industry and area standards.

Where veterans have waived the right to re-employment, positive evidence will be required, and the burden of proof will rest upon the employer.

These electrically trained service men and millions like them will want jobs when they return (Marine Corps Photo)

1

dis-

lity
ing
y a
re-
all
ice
or
ney
ors
ent

hat
ted
ily,
or-
ces
lso
ees
hin
.
rm
out
ary
er-
es,
en-
eir

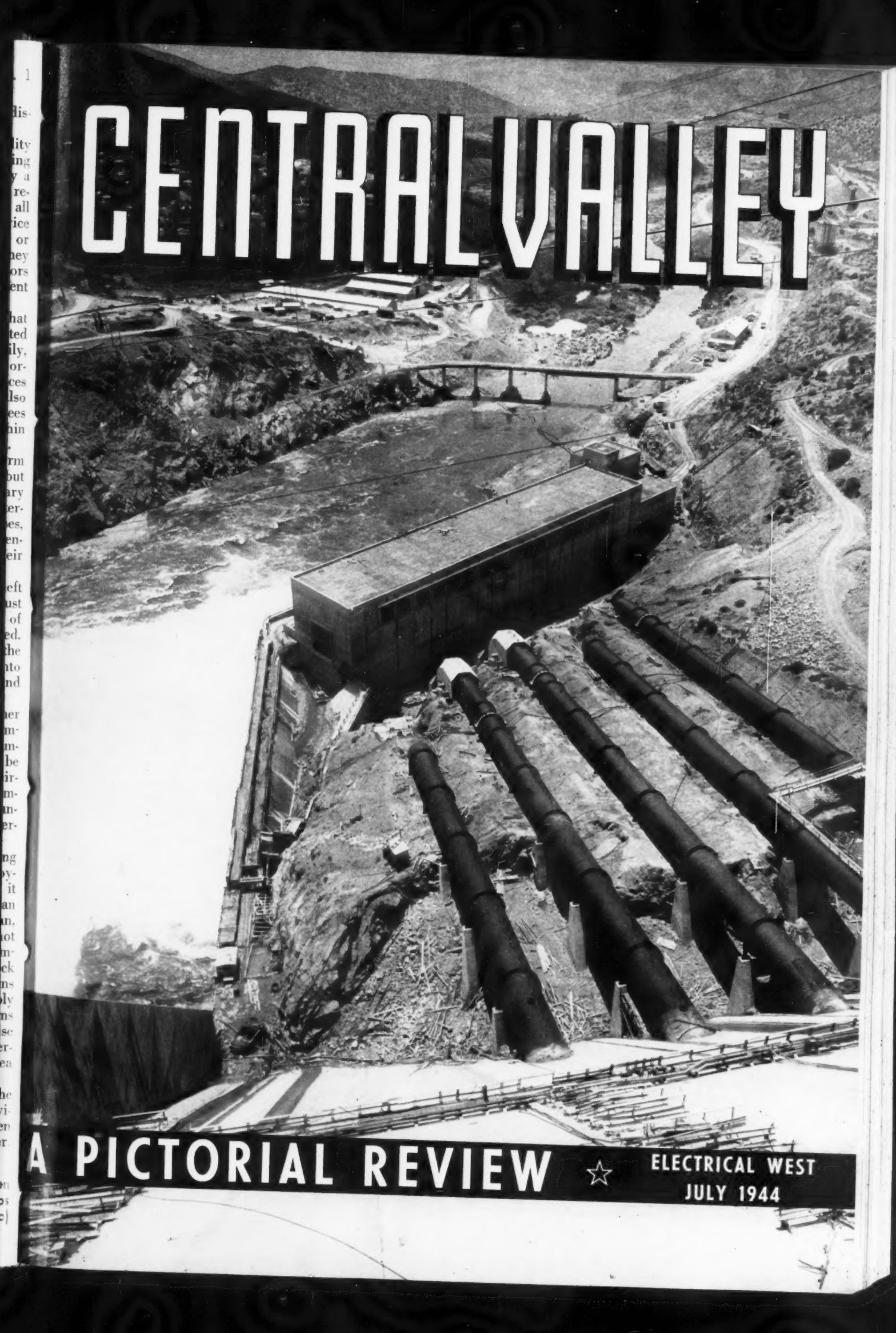
eft
ust
of
ed.
he
nto
nd

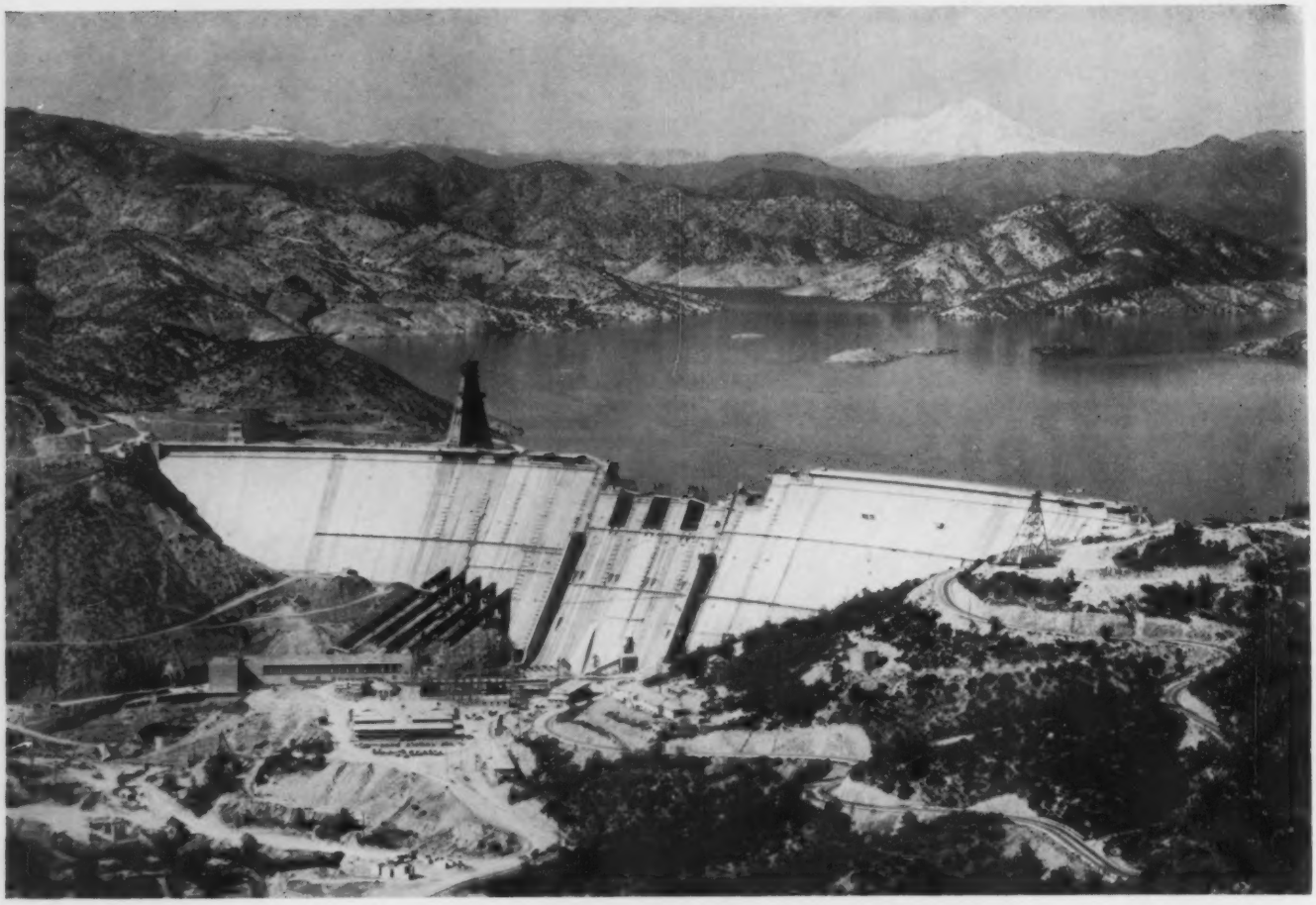
her
m-
m-
be
ir-
m-
un-
er-

ng
oy-
it
an
an,
not
m-
ck
ns
ly
ns
se
er-
ea

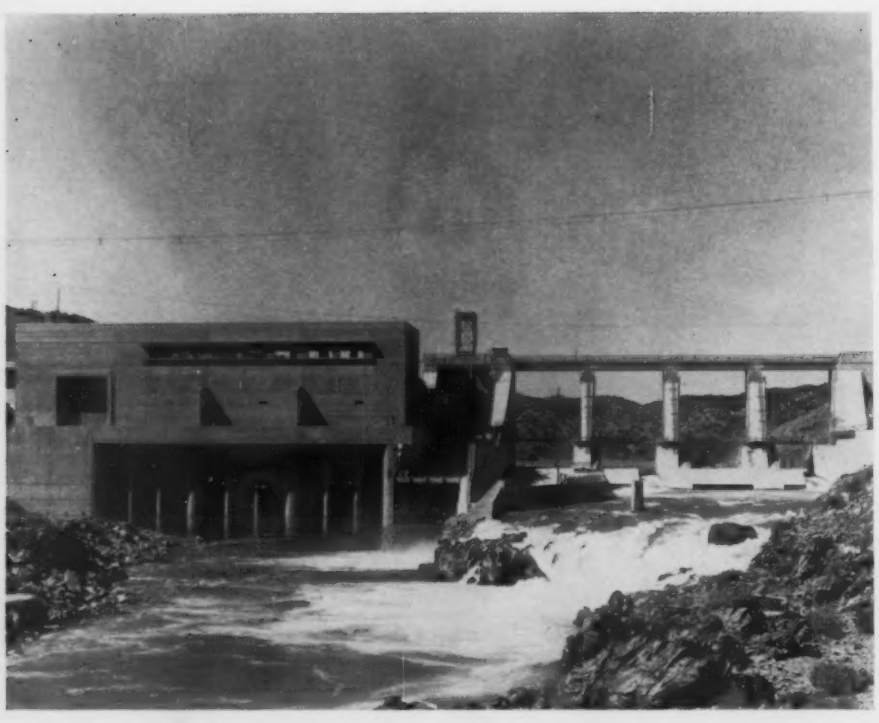
he
vi-
er
er.

en
os
c)


CENTRAL VALLEY
A PICTORIAL REVIEW
ELECTRICAL WEST
JULY 1944



IRRIGATION—FLOOD CONTROL—POWER



SHASTA DAM and power house dedication on July 14 marks near completion of the most important component of California's Central Valley Project, a multi-purpose project of the U. S. Bureau of Reclamation costing $333,000,000. Built as an irrigation, flood control, navigation aid, salinity control and power undertaking, this immense development is of great economic importance to all of northern California, particularly to the highly productive Sacramento and San Joaquin valleys.

Central Valley was a state conceived

Shasta dam will store more than a year's runoff from a drainage area of 6,600 sq. mi. Two of five 75,000-kw. generators now go into operation in the power plant. Height of dam 602 ft.

Left: Keswick dam forms an afterbay for Shasta to reregulate river flow. Three 25,000-kw. generators are to be installed in the completed power house when made available. Height is 148 ft.

and planned development in the beginning, having been approved at a special election in 1933, authorizing issuance of $170,000,000 in revenue bonds. Federal aid was later sought and, on Dec. 2, 1935, the government officially took over the project upon President Roosevelt's approval of the feasibility report of Secretary of the Interior Harold L. Ickes. Actual construction as a Bureau of Reclamation project was started on Feb. 19, 1937, and has been prosecuted diligently since that time.

The project is one of the most comprehensive water conservation developments ever undertaken. Initially it will consist of Shasta Dam and power house; Keswick Dam and power house, both on the Sacramento River near Redding; and Friant Dam on the San Joaquin River near Fresno, together with some 415 miles of canals and four pumping plants that will require approximately 150,000 kw.

It is a long-range project that will include diverting water from the Sacramento River in the lower delta region and transporting it via a 10,000-sec. ft. canal and pumping plants into the San Joaquin Valley, where the water table is as low as 250 ft. in places. Friant Dam, with storage of 520,000 acre-ft. and its system of canals, will further augment water supply in the San Joaquin Valley.

Shasta Dam, impounding 4.5 million acre-ft. of water and containing 6,000,000 cu.-yd. of concrete, ranks in terms of mass as the second largest structure ever built by man. It stands with Boulder, Bonneville and Grand Coulee as another monument of engineering achievement in the West.

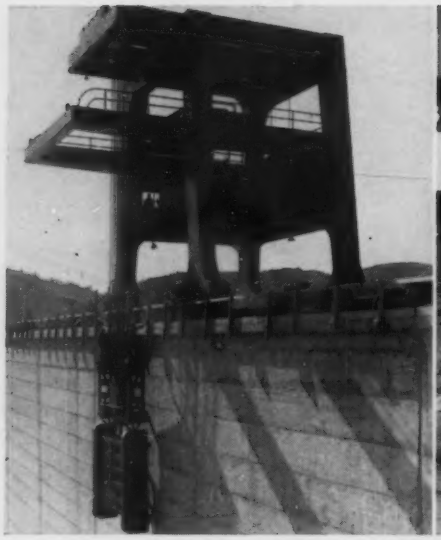
Immediately below the dam is located a power house that will contain five 75,000-kw. units, two of which now go into operation. Two sister units, diverted to the Grand Coulee plant on the Columbia, will be moved to Shasta after the war and the fifth unit will subsequently be installed to bring the plant to its ultimate capacity of 375,000 kw., with output, including Keswick, estimated at 1.5 billion kilowatt-hours annually.

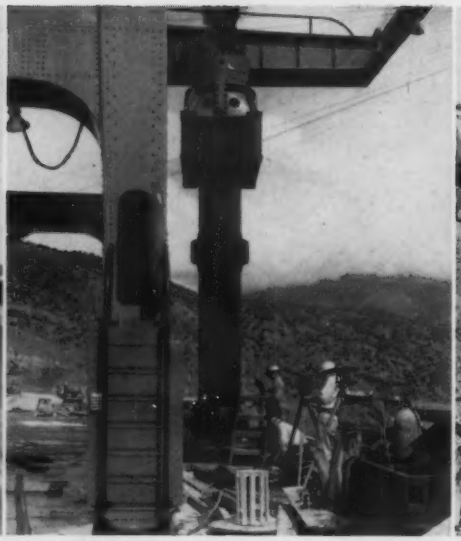
Another dam, known as Keswick, now fully completed, located a few miles down-stream from Shasta, will serve to reregulate river flow in order to permit more latitude in the use of water for power generation at the Shasta plant. Passage of water at Keswick other than over the spillway, will be through the power penstocks only, and the Sacramento River regulated to a flow sufficient

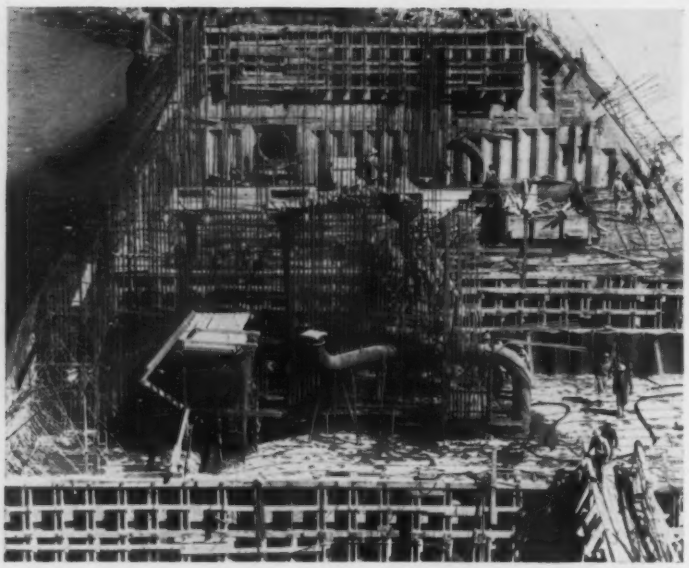
to control salinity in the lower delta region of the river and to move the point of dependable navigation many miles above the city of Sacramento. The power house at Keswick is completed, but installation of the three 25,000-kw. units which it will contain has been delayed by the war. Highlights of Shasta Dam and power house are told in pictures in the pages that follow.

Relocation of 37 miles of Southern Pacific main line was a major feature of the job. This massive railroad and highway bridge spans Pit River canyon on the new line

Shasta Dam is perhaps best known by its famous 12-mile conveyor belt used to transport more than 6,000,000 cubic yards of aggregate from Redding to the job site

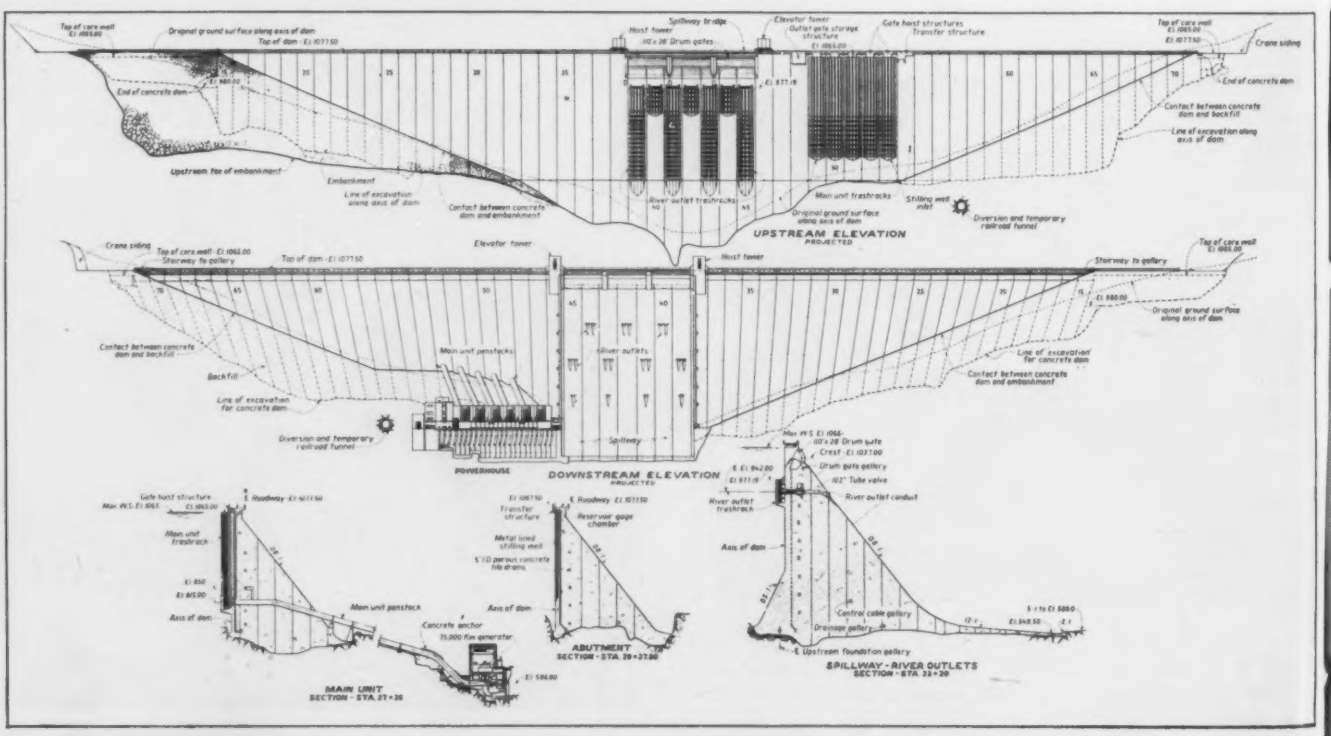


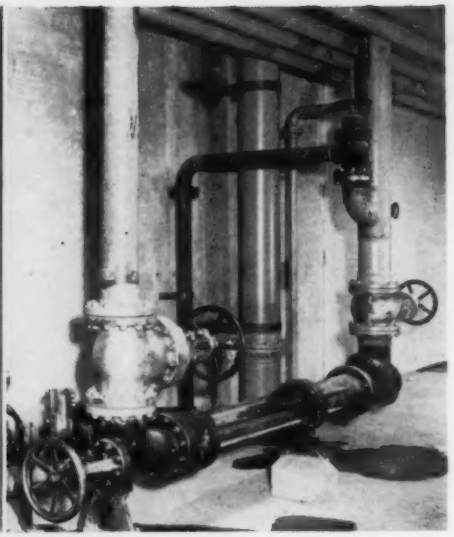




HYDRAULIC

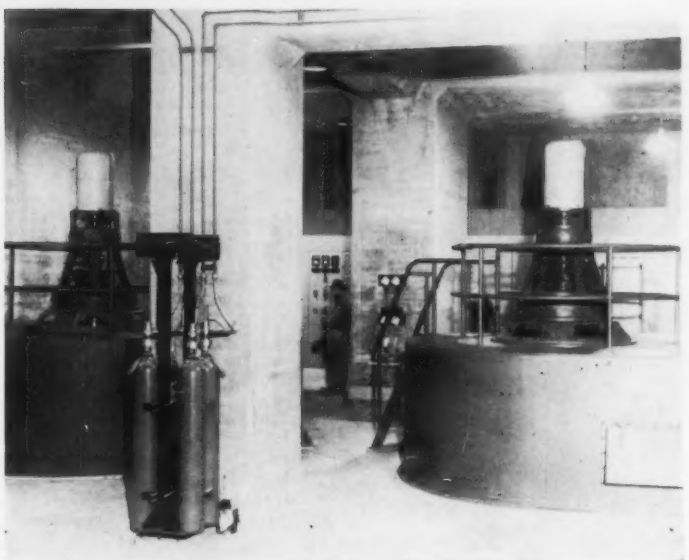
SHASTA Dam will be provided with three drum gates, each 110-ft. long, in the spillway section of the dam shown at upper right that will handle a flood of 190,000 sec.-ft. Five 15-ft. main unit power penstocks, 800 ft. in length, pass through the right abutment. Through the spillway section of the dam are eighteen 102-in. outlet pipes with tube valves for controlling water discharge from the dam. For installing trash racks, penstock gates and operating mechanism, and for future maintenance, the gantry crane at upper left was supplied by General Electric Co. Regenerative braking is used and special control gives hoisting and lowering speeds inversely proportional to the load. Only one other crane of its type has been built. Operation of the gates, one of which is shown being lowered by the crane, is by means of hydraulic cylinders. These vertically mounted cylinders (upper center) have 7½-in. steel extension stems, 225 ft. long, running down the face of the dam for attachment to the gates. On top of the dam is a wide roadway to be lighted by continuous tube high-voltage fluorescent.

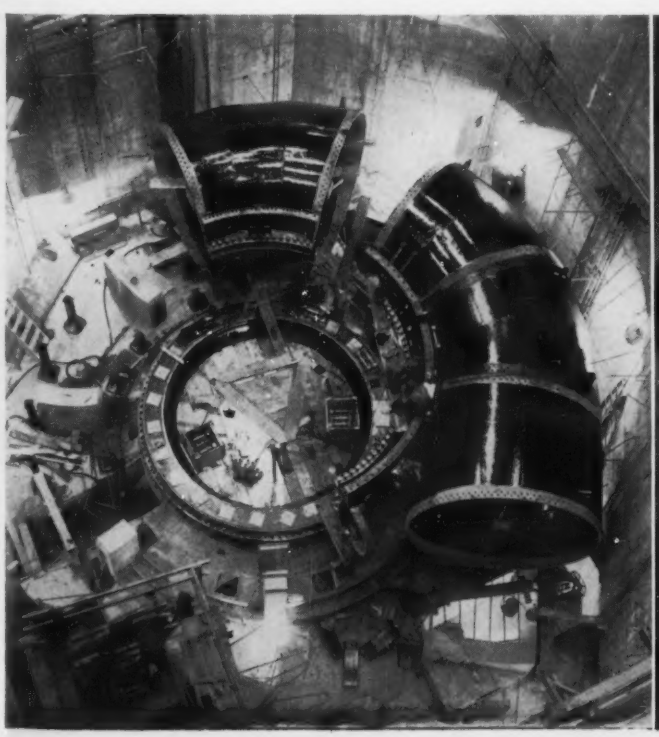




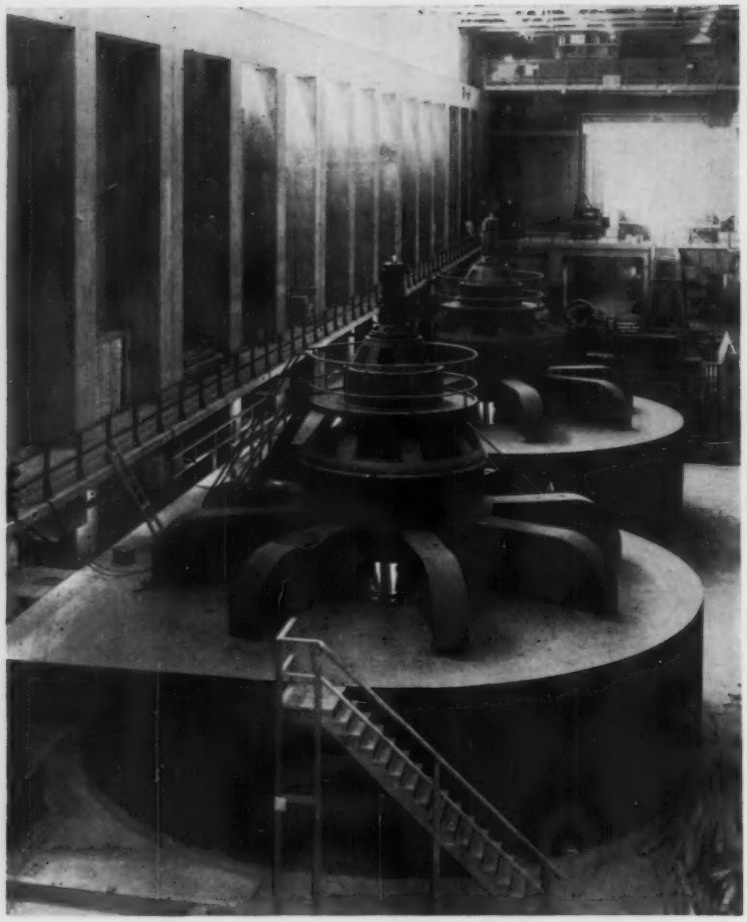
FEATURES

MAIN turbines at Shasta, supplied by the Allis-Chalmers Mfg. Co., are rated at 103,000 hp., 138.5 rpm., with full gate at 330-ft. head. Water required at this head is 3,200 sec.-ft. Maximum efficiency of 91% is expected. Operating range is from 238 to 475 ft., with net effective head between 366 and 475 ft. for 75% of the time. Average net effective head will be 408-ft. One of the 103,000-hp. turbine runners is shown at lower right. Because of inability to obtain scroll case castings of the size required under war conditions, the turbine manufacturer developed the riveted sectional joint, plate steel scroll cases used, the largest ever so fabricated. One is shown at lower left. The two house generators, right, rated at 2,500 kw., furnished by General Electric Co., are driven by James Leffel Co. turbines. Massive concrete anchorages for the penstocks are shown at upper left. Penstocks vary in thickness of steel plate from 1 in. to 2 1/16 in. Joints were electrically welded (center). Cooling water for transformers and generators is supplied by eductor type pumps as shown in the picture at upper right.



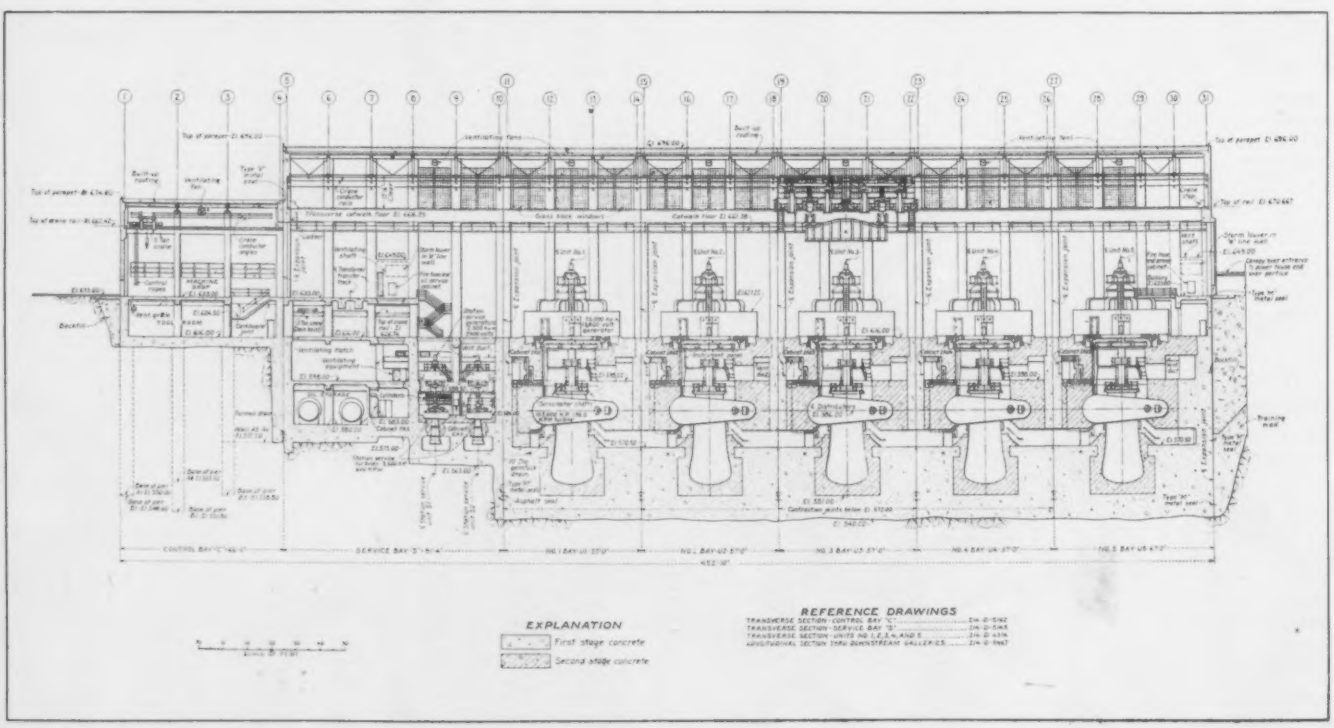


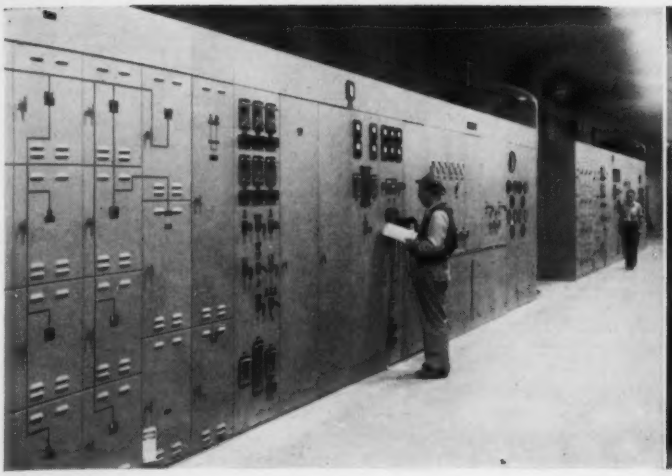
POWER HOUSE

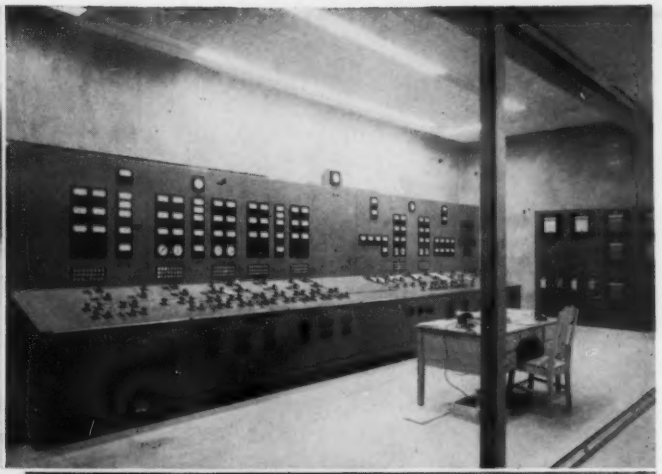


SHASTA power house, located on a rocky ledge some 800 ft. downstream from the dam, will contain five 75,000-kw. generators. Units three and four shown in the photograph above are now in operation. Sister units one and two, diverted to Grand Coulee for the duration, will later be removed to Shasta according to present plans and installed in vacant positions to the rear of the two units shown above. Some idea of the physical dimensions of the 103,000-hp., 75,000-kw. units may be had from the size of the vacant pit for No. five machine shown to the right, 57 ft. deep from generator floor.

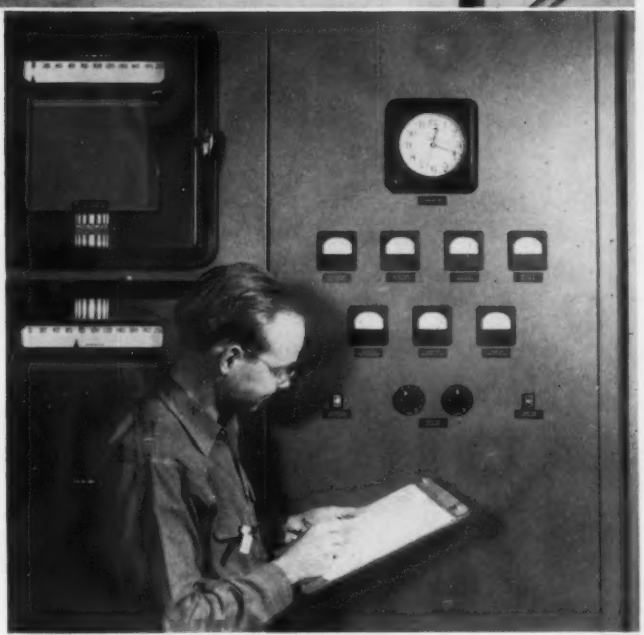
BELOW is shown a longitudinal cross-section of the power house, showing the five main generators. Slide gates have been provided in the tailrace openings. There are three of these per unit which may be closed should it become necessary to un-water the draft tubes, the tailrace elevation being subject to some variation due to water discharged through the dam outlets and from the fact that Keswick reservoir when full will raise tailrace elevation. Un-watering is accomplished by two 1,500-gpm. pumps for each unit. In addition, each unit has two 5,000-gpm., 75-hp., motor-driven sump pumps.





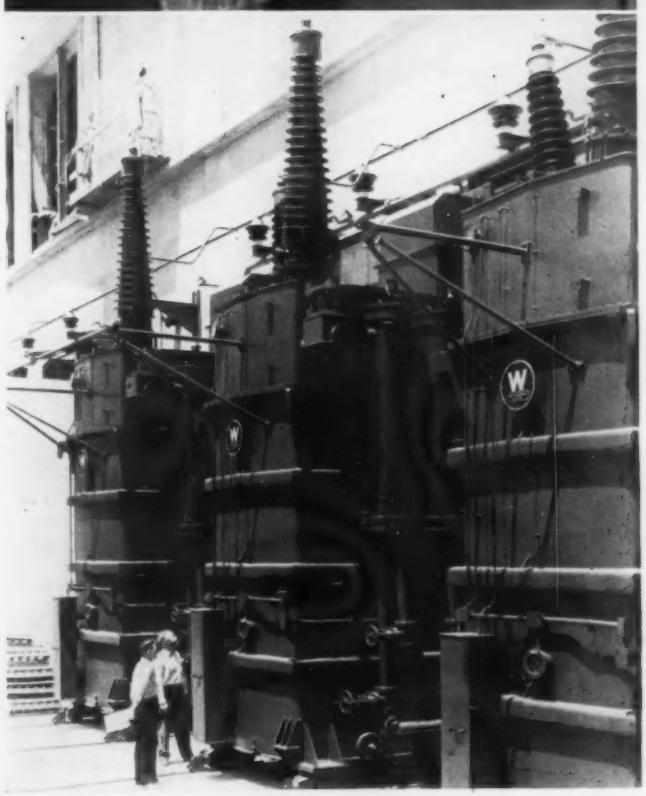


ELECTRICAL



ELECTRICALLY, the plant incorporates only those features found desirable based largely upon operating experience at Boulder and Grand Coulee. At Shasta there was a definite trend toward simplicity and the elimination of elaborate or fancy automatic and protective devices. The plant has two main control or operating centers interconnected by communication, indicator and annunciator systems. Turbine control, Woodward governors and auxiliary power boards, shown at the upper left, are located in a long room on the generator floor, while the main switchboard room (upper right) is some distance removed in an upper corner of the building. The machines are brought up to speed at the governor and control boards and then turned over to the operator at the main switchboard for either manual or automatic synchronizing and normal operation. In the switchboard room is located Leeds & Northrup automatic time-frequency control equipment of the latest type, shown at the right. Standard time will be checked daily by special radio receiver with Arlington, Va.

Basic design of the plant follows the Bureau of Reclamation's standard practice of supplying house turbines and generators for auxiliaries and station service, rather than the alternative of providing a double bus, breakers and transformers. However, in this plant provision has been made in addition for supplying house service from a 2,500-kva. transformer fed from an auxiliary 13.8-kv. bus that may be energized from any one of the main generators through switches, so interlocked that the main units cannot be paralleled on the 13.8-kv. side.

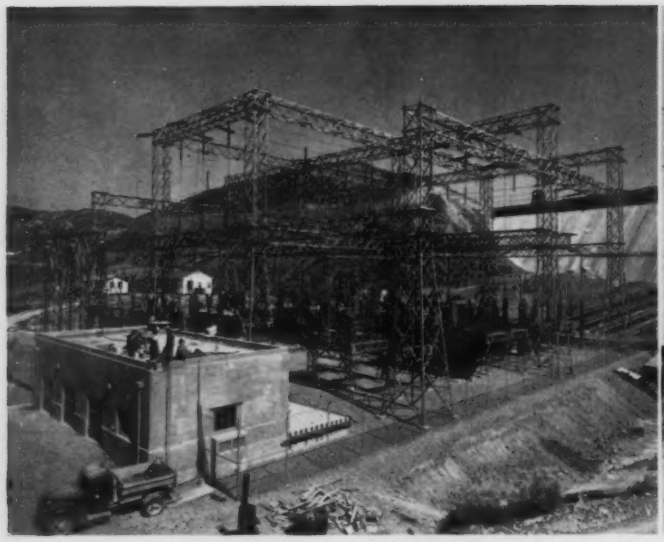


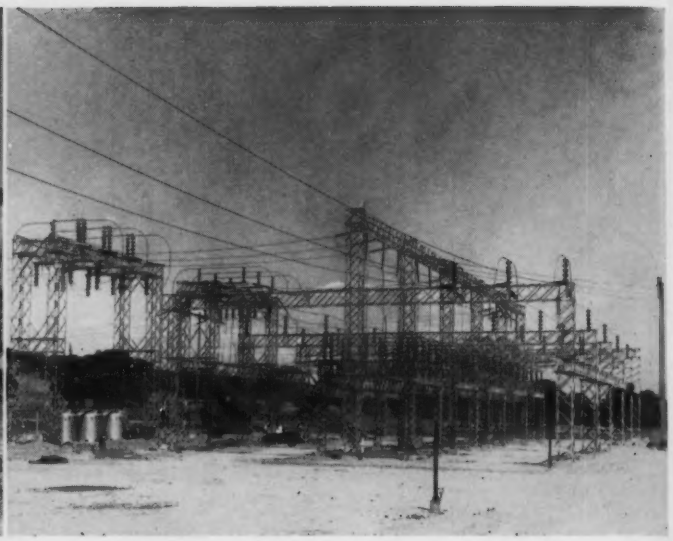
Generator leads are carried in bus duct directly to the low side of the main transformer banks without circuit breakers. Each main unit has its bank of three 25,000-kva., 13.6/132.8/230-kv. transformers located in cells along the outer wall of the building on the tailrace side. A gantry crane operating on a concrete roadway serves the transformers and the tailrace slide gates. The main transformers (lower right), supplied by the Westinghouse Electric & Mfg. Co., are of the water-cooled, external radiator type, with forced-oil circulation. Cooling water for the transformers as well as the heat exchangers for cooling the generators, located in the generator housing, is supplied by pumps of the very efficient eductor-type shown in a preceding photograph.

Duplicate three-phase transformers are provided to step down the 2,300-volt house generator voltage to 440 for auxiliary power and 120/240 for lighting. Auxiliary switchgear and cubicles as well as generator control, governor cabinets and main switchboard were supplied by the NEMC Electric Co., of Seattle.

Shasta is the second plant, Boulder being the first, where current transformers with 1-amp. secondaries were used. This was done to reduce secondary burdens because of long runs. At Shasta, control cables are some 2,000 ft. in length between the power house and the 230-kv. switchrack on the opposite side of the river. To provide maximum protection and reliability, these circuits are carried through a tunnel in the dam and thence underground to the switchyard.

The power house is a self-contained operating unit, containing besides features already mentioned, a machine shop, oil treating plant, drafting room, laboratory, offices, an electric kitchen and an elevator.





SUBSTATIONS—TRANSMISSION

FOR the present, at least, the bureau is under contract to sell Central Valley power to the Pacific Gas and Electric Co. Delivery will be made over a 100-mile, single circuit, 230-kv. transmission line built by the bureau and now nearing completion. The private company will absorb the power into its 230-kv. system at two points, one at its Shasta substation, 28 miles from the Shasta plant, and the other at Oroville, at the end of the bureau's 230-kv. line, which the private company leases.

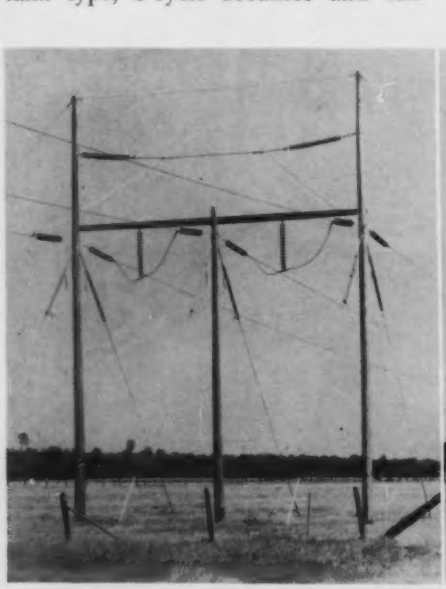
At Shasta sub, delivery will be made through a 5-cycle, General Electric Co. circuit breaker of 2,500,000 kva. interrupting capacity provided by the power company. At the bureau's 230-kv. switching station at the Shasta plant, there has been provided four tank type, 8-cycle breakers and one 3-cycle impulse breaker, all furnished by General Electric Co., having interrupting capacities of 2,500,000 kva.

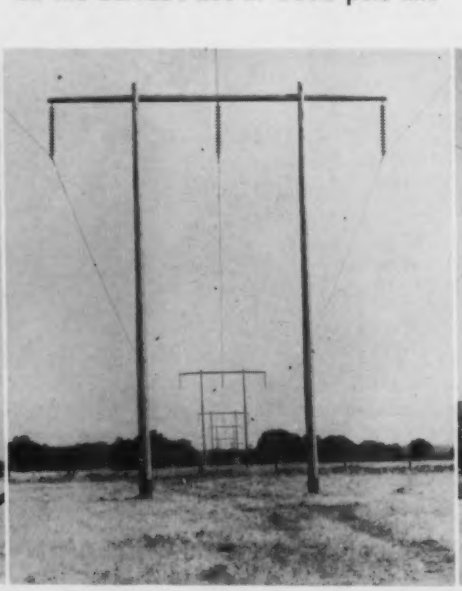
The bureau's transmission line is one of several 230-kv. wood lines built during the war as a result of the steel shortage. Conductor is 795,000, cir. mil ACSR; prevailing span length 700 ft. and average pole height 65 ft.

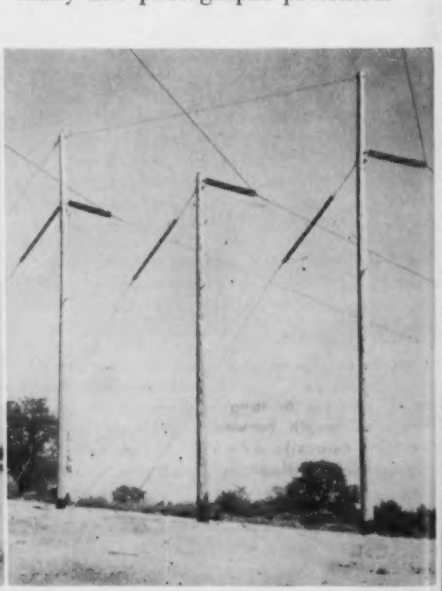
Principal communication from Shasta plant will be by General Electric carrier telephone over the 230-kv. line, with audio coupling to the private company's carrier at Shasta substation.

Design of the Central Valley Project is under direction of S. O. Harper, chief engineer for the Bureau of Reclamation at Denver, with J. L. Savage as chief designing engineer and L. N. McClellan as chief electrical and mechanical engineer, both in Denver. Ralph Lowry is chief construction engineer at Shasta and I. C. Harris is electrical engineer in charge of power plant installation and operation. C. E. Carey, regional director USBR at Sacramento, will be in charge of operation and H. E. Bixby is chief of the regional branch of power utilization, Sacramento. ELECTRICAL WEST acknowledges its indebtedness to the Bureau of Reclamation for all the many fine photographs presented.

One of three switchrack positions at Shasta plant as shown at the upper left is now complete. At upper right is Shasta substation of PG and E, one of two feed-in points to the private system for Central Valley power. Below is shown three types of construction used on the bureau's 230-kv wood pole line







N

pri-
sub-

oject
rper,
Rec-
Sav-
and
l and
nver.
n en-
ris is
power
C. E.
R at
oper-
f the
ation,
r ac-
the
l the
.

Savings Through Planned Modernization

How to blueprint a postwar modernization program is told in this recent presentation before the PCEA Operating Economics Section

O. A. Gustafson
General Electric Co.

IN addition to the normal aging of much electrical equipment, the war has caused considerable acceleration. Rotating machinery, transformers and breakers have been heavily overloaded in many cases since war began. This applies not only to old equipment, but to the new as well. Certainly the need for complete replacement or modernization has been increased.

Reference has been made to several types of electrical equipment in connection with this subject of modernization. Illustrative of some of the possibilities, the remainder of this discussion will pertain to rotating equipment. However, similar examples could be provided for breakers, transformers, relays, motors, communications, distribution systems, etc.

Example I

A 30,000-kva. condenser designed in 1922 will be considered. It has operated with air entering from underneath and discharging through openings in the stator into the station. Considerable maintenance was required through the years to keep the unit clean. The importance of continued reliable operation and the condition of the stator winding suggested its reinsulation. A check with the manufacturer indicated additional possibilities for a long-range program. New fans, a Class B stator winding with 24% more copper, and changes in the rotor would permit an ultimate rating of 37,500 kva.

New fans and stator winding have been installed with operation at lower temperatures and lower losses pending the rotor changes when full increased rating of 37,500 kva. can be obtained. Consideration is being given to use of surface air coolers to reduce maintenance due to entrance of dirt in the cooling air. Certainly, the program adopted was better than mere reinsulation of the original winding. The unit required some attention anyway, and any extra expense necessary to provide a needed 7,500 additional kva. will be far less than the cost of 7,500 kva. in a new separate unit.

Example II

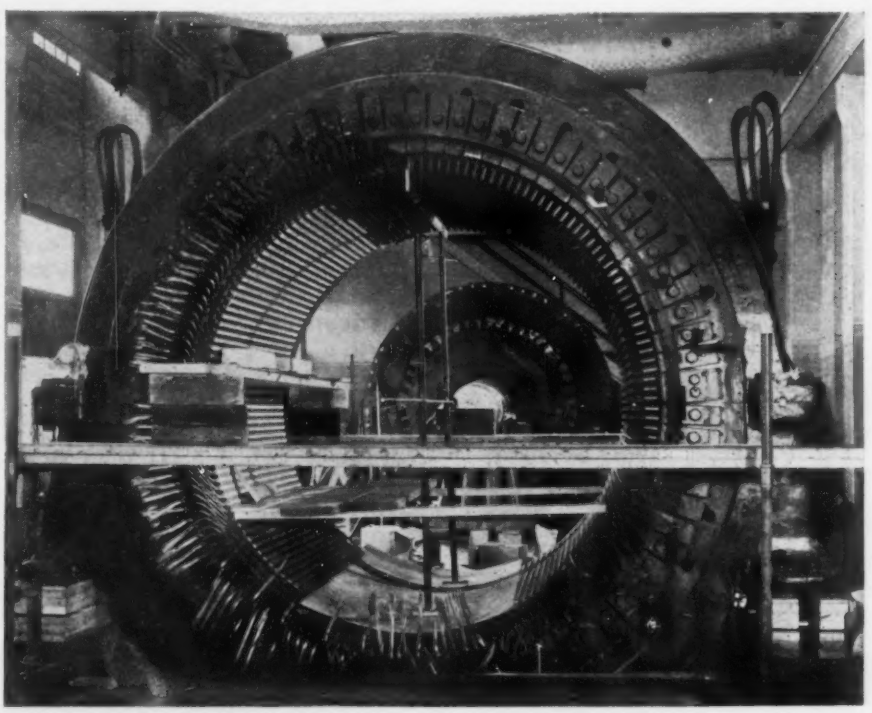
A station has two 15,000-kva. synchronous condensers designed in 1921 and one 30,000-kva. machine designed in 1923. Dirt from an adjacent gravel pit presented a problem of maintenance. War loads required full output which was difficult to maintain during the summer except when the units were quite clean. Consideration of the problem disclosed that much could be done to improve the situation. Table I indicates what can be exepected from the 15,000-kva. units.

Results of the study for the 30,000-kva. unit are given in Table II. New fans have been installed with an increase in air flow of 45% for the smaller units, and 31% plus for the largest unit. Only a few days per unit were required to install the modern fans and make the necessary modifications to the air deflectors on the machines. This improvement in air flow will permit operation at full output during the summer and even with some dirt in the units.

The condensers now secure air from the outside from below and also discharge below to the outside. The arrangement lends itself very nicely to the use of surface air coolers making enclosed systems easily obtainable. An important part of full modernization will include such coolers in order to eliminate high maintenance for dirt removal and to maintain full output for the units.

The tables indicate that full modernization can add 30,000 kva. to this station. This is largely achieved by some reduction in lagging capacity, Class B insulations and improved ventilation. The value of a planned modernization program is immediately obvious. Without a plan, a failure in one of these 20-year-old units could easily result in a mere duplication of the damaged part. With the plan, the improvements would be incorporated, with a resulting additional 30,000 kva. when full modernization is achieved. The full program will cost less than a new 30,000-kva. condenser.

It is possible to say that the additional capacity costs nothing or that normal maintenance is free. In addi-



Modernizing this 30,000-kva. synchronous condenser by Los Angeles Dept. of Water & Power increases capacity

tion, the total losses in the three modernized units at 90,000 kva. will be approximately 230 kw. less than the losses of the three units with present windings plus losses of one new 30,000-kva. hydrogen cooled condenser. This particular station certainly indicates maintenance by modernization rather than straight duplication.

Example III

Let us look at a hydroelectric station with four horizontal units designed in 1922 for 20,000 kva. at .875 pf. The winding insulation is Class A for stator and rotor. Air is drawn from the outside under the unit and discharged from the stator frames into the station. In excess of 2,000 kw. at full load is dumped into the station which provides an unwanted heater during the hot summer months. The modernization possibilities of these units have been reviewed and the results are promising. An all mica Class B stator winding permits additional copper and lower losses or increased capacity. New fans are possible along with some modification of air deflectors to provide additional air flow. Surface air coolers can be easily added to the installation. The field windings can be reinsulated for Class B operation. The complete program is simple and can be carried out in an orderly step-by-step process or all at once at the discretion of the owner. Table III indicates what can be accomplished. The owner has ordered one set of Class B stator coils and one set of fans and air deflector ports so the modernization is under way. It is estimated such a complete modernization would cost the owner about $65,000 per unit.

It would be possible to give many more illustrations of what could be done by modernization, but it is believed that the actual cases cited serve to emphasize the possibilities sufficiently. Not all will be as favorable. As previously mentioned, study of some installations may disclose complete obsolescence, requiring complete new equipment.

Naturally the question of cost must be considered, particularly if modernization does not coincide with some emergency failure. Expenditures under such circumstances are not questioned. Possibly some forget the depreciation item in their accounting structure. Equipment is written off the books and presumably there is money in the till to replace it, but too often it continues to operate even after it is due for modernization or definite replacement.

Naturally, the war period is not one in which to consider modernization seriously except where it will further the war effort. However, it would appear that in time of war some blueprinting for postwar modernization can be undertaken. A real contribution to our immediate postwar economy can be effected by a well planned and vigorously executed modernization program.

It would appear that equipment users should ask themselves the following questions:

1. Is my basic system or process sufficiently modern?
2. Have I a modernization or planned replacement program for all my older equipment?
3. Will I carry out such a planned program when the war ends?

Table I

	Original	With new stator winding	With new stator and field windings
Kva.	15,000	20,000	22,500
Volts	11,000	11,000	11,000
% original flux	100	89	89
Winding pitch	.6643	.857	.857
Lagging kva. zero field	15,600	12,100	12,100
Cfm. old fans	100%	...	...
Cfm. new fans	145%	145%	145%
Allowable rotor rise (by resistance)	60°C	60°C	80°C
Allowable stator rise (by detector)	60°C	60°C	60°C
Kw. loss without exciter loss	100%	100%	111%
Main rheostat	old	old	none
Pilot exciter	none	none	new
Main exciter	old	old	new
Weight stator copper	5,175 lb.	8,300 lb.	8,300 lb.
Insulation stator (Composite)	Class A	Class B	Class B
Insulation rotor	Class A	Class B	Class B
Surface coolers:			
Total gal. per min.			300
Water temperature			850°F

Table II

	Original	New stator and field windings and new pole pieces
Kva.	30,000	45,000
Volts	11,000	11,000
Flux	100%	100%
Pitch	.856	.856
Lagging kva.—zero field	35,500	25,000
Cfm. old fans	100%	
Cfm. new fans	131%	131%
Expected stator temp. rise (by detector)	Less than 60°C	Less than 60°C
Expected rotor temp. rise (by detector)	Less than 60°C	Less than 80°C
Estimated kw. loss	100%	120%
Main rheostat	old	new
Main exciter	old	new
Pilot exciter	none	new
Pole pieces	old	new
Weight stator copper	100%	125%
Weight field copper	100%	113%
Insulation stator (Composite)	Class A	Class B
Insulation rotor	Class B	Class B
Surface coolers:		
Arrangement		Two sections
Gal. per min.		700
Water temperature		85°F

Table III

	Original	New Rating
Kva.	20,000	25,000
Pf.	.875	.9
Kw.	17,500	22,500
Fans	old	new
Air deflectors	old	modified
Stator insulation (Composite)	Class A	Class B
Rotor insulations	Class A	Class B
Rotor winding	old	reinsulated
Air gap	original	1/8" less
Weight stator winding	100%	114%
Weight rotor winding	100%	100%
Surface coolers:		
Arrangements		Two sections
Gal. per min.		400
Water temp.		70°F
Cfm. air flow		Est. 60,000

Has Salesmanship Gone Plumb to H---?

Selling clinic at San Diego conference seeks the means to draw it back, recondition it preparatory to resumption of goods to sell

CLASSIFIED as non-essential, emerging only under aliases, without electrical wares to sell, salesmanship has suffered not only a long total eclipse but many a dirty name in this time of war and deprivation. But there'll come a day—. And when it comes how it will be needed!

In preparation for that new C-Day (Consumers Day) when the gears are shifted from war to consumer goods, the forward looking Bureau of Radio and Electrical Appliances of San Diego County made this subject the meat of a "selling clinic" at its recent conference in San Diego. (See June 1944 issue, p. 103.)

Because the clinic explored the subject of overhauling salesmanship, reconverting it, paving the way for its resumption in such an analytical way, a resume of the discussion is printed here. It may well find use by sales managers, league or bureau executives or others facing the necessity to reactivate salesmanship in their own organizations or among dealers and their personnel. It can be presented as a symposium, or used as an agenda for conference training.

At the San Diego meeting, the speakers were introduced by E. W. Meise, merchandise manager, San Diego Gas and Electric Co. They were: M. G. Sues, vice-president, Leo J. Meyberg Co., Los Angeles; Chris Griffin, manager, General Electric Co. distributorship; Burt Dorris, Pacific Coast manager, Stromberg-Carlson Co., San Francisco; Harry Fogwell, president, Thermador Electrical Mfg. Co., Los Angeles; and E. M. Frellson, appliance sales manager, General Electric Supply Corp., Los Angeles. The outline of the subject, as treated by each, follows:

M. G. Sues—Described the Appliance sales situation today. Practically all salesmen and many sales managers have scattered to work in other fields. Many, perhaps the best, may elect to remain in their new fields. Comparatively few can be counted on to return.

Described "selling" as we find it today. Everyone, including ourselves, has "gone soft"; we have forgotten the technique of selling. We are careless, frequently discourteous and sometimes arrogant. Many of us forget that the scene will change one of these days. A tremendous problem in human reconversion faces us.

Chris Griffin—Difficult as plant reconversion is expected to be, manpower reconversion is certain to be a much more difficult problem. With our former sales personnel scattered, we will have to look to entirely new fields for selling manpower. Millions now doing mechanical work or otherwise employed in war plants will have to turn to new pursuits. Many might become good salesmen. Most will not know whether they can sell.

There are tried methods of predetermining the qualifications required for successful selling, or for any other occupation. We must lay plans to utilize such methods (which are about 80% successful) in order to have potential material.

Formerly, we took anyone who said he could sell. Tests have proved that 16 house-to-house salesmen were hired to produce one really good salesman; 12 were required in insurance selling to find one producer, and only one out of four miscellaneous retail sales persons could be considered really successful.

Burt Dorris—After determining to some extent that our subject material for sales jobs is suitable, sales training is the next step. This has been almost a "lost art" for the past four years or so. Practically no one is carrying on this type of training now. We will have to plan as manufacturers and distributors to set up such courses and to make them available for our dealers.

But we don't have to wait until the war is over and sales forces are again being assembled to start doing something. We can immediately take inventory of our abilities to take advantage of sales brush-up courses available NOW for what personnel we do have. Start training people we now have away from the bad habits into which selling men and women have fallen (as touched on by Sues).

Harry Fogwell—Not long after reconversion, competition between industries will become intense. The battle we shall have for the customers' dollars will be the toughest we have ever known. Our greatly expanded plant facilities will be in position to turn out quantities of electrical appliances and products which were undreamed of before the present war.

Now we can sell anything in our lines that manufacturers can make or we can get our hands on. Tomorrow, manufacturers will say, "we can produce anything you can sell."

To salesmanship will fall the responsibility of getting fantastic quantities of goods and material into the hands of the public. It must be so, or we cannot possibly provide the employment for the several millions *more* people that CED estimates we must employ over what we had in the peak year of 1941.

Manufacturers, as never before, will take a direct interest in seeing that their distributive agencies do something about getting and training the manpower they should have. Otherwise, the flow of manufacturers' products will surely be held up by the bottleneck of selling power shortage.

E. M. Frellson—The standing of salesmanship has fallen into a dangerous position since the outbreak of war. Having been considered as about the lowest form of non-essential occupation by the WMC, the public has come to have a similarly low regard for this profession.

In our schools and colleges, sales training courses have been practically non-existent during the past four years. Authentic polls of college students today disclose that only a negligible percentage of them indicate an intention to go into this type of work.

This is partly the fault of business and industry. Since the sellers market has been with us, we ourselves have often belittled the part salesmanship plays in our operations. We must collectively get busy and elevate the standing of this profession. We must realize that it will positively be up to selling to preserve our American system of free enterprise. For only through selling can the necessary jobs for all other phases of business and industry be maintained and, if unemployment can't be largely eliminated, free enterprise will surely be in grave danger.

Let us start at home, right now to begin building into the art of selling the prestige that it will have to carry, if in the years ahead we are to continue as a nation dedicated to the American system of free economy.

Policies for Future Merchandising

Prepared and presented by the planning committee of the alert and enterprising San Diego Bureau of Radio and Electrical Appliances

Frank Guast.
Chairman of the Planning Committee

No. 3

Planning Guide

derived from a realistic and experienced industry study and passed on to the electrical industry as an aid to sounder and more efficient handling of appliance distribution in the future. Without merchandise now and time to think out clearly the lessons to be learned from the past and its mistakes, these recommended policies can and should be used as a guide by individual manufacturers, distributors and dealers in preparing to re-enter the selling of appliances when available.

1. Manufacturer-Distributor Responsibilities:

MANUFACTURERS and distributors are urged to study carefully both the local market possibilities and the present dealer coverage in the territory before considering the franchising of additional outlets. With the prospect of but limited appliance production to begin with it is unlikely that existing dealers will be able to secure all the stock they need. Therefore, it seems reasonable to urge limitation of new outlets until all those who have remained in business are properly supplied.

If new outlets appear necessary, after a study of the existing dealer structure, manufacturers or distributors are urged whenever possible to franchise some firm which is already in business and may have been engaged to some extent in appliance selling or servicing, rather than to encourage the establishment of an entirely new business in the community. It should be the established policy to so encourage and strengthen the dealers who have remained, as to insure even a more substantial type of appliance representation than existed before the war.

b. Manufacturers and distributors are urged to look for the following qualities in re-establishing appliance franchises or in setting up new accounts: financial soundness, background or aptitude necessary to success in appliance selling, willingness to maintain adequate stocks and displays, and general business integrity.

c. In that guarantee and warranty policies of manufacturers must be administered by distributors and dealers, it should be their privilege to recommend any changes they deem necessary in keeping with sound business principles. Following are such recommendations:

All manufacturers guarantee and warranty policies are obscure and misleading to the purchaser who generally fails to read the "fine print" and thus misinterprets what is represented. Clarification of such wording is strongly urged to insure a full understanding by the purchaser of the *limitations* of these policies. If this is done, the dealer will have a better opportunity to collect for services the purchaser now thinks were included, but which actually were not covered in the guarantee or warranty.

Limitation of the dealer's liability in connection with major appliance guarantees is recommended. This seems particularly advisable in connection with the five-year refrigerator warranty plan. We do not believe it is necessary to guarantee a refrigerator for longer than one year. If manufacturers insist upon this policy, some financial arrangement should be worked out whereby the dealer is properly remunerated for any calls or service he must make to back up the manufacturers representations.

d. Recognizing that the dealer is the most important cog in the program of maintaining customers appliances, it is recommended that manufacturers and distributors franchise only those firms who either maintain adequate servicing facilities themselves, or who have arranged for such adequate service, otherwise.

e. In the past, many manufacturers and distributors have not been greatly concerned in seeing that established prices were maintained by their dealers. In the belief that these agencies should be concerned, it is strongly recommended that a uniform policy be adopted by all manufacturers and distributors in demanding strict adherence by their dealers to the established prices of their products.

2. Trade Diversion Evils and the Need For Correction:

a. The cooperative of both the consumer and production-for-use type presents a rapidly growing threat to legitimate appliance retailing as well as to many other businesses. (This is true in our own territory where five such organizations are clearly established through which members may purchase appliances and other such equipment virtually at cost. Agitation is now under way to organize strictly consumer cooperatives within the City of San Diego, in addition to the five already mentioned which are largely of the production-for-use type.)

Cooperatives which enable their members to purchase appliances and other commodities direct, in competition with private business, are able to do so because: (1) they largely escape taxes; (2) do no advertising, and (3) do no research work to speak of. Their continued growth constitutes a definite threat toward individual initiative and could eventually lead to state socialism.

Manufacturers and distributors are urged to refrain insofar as possible from granting franchises to cooperatives which offer competition by way of price concessions, or rebates which constitute a discount. It is hoped that legislation to combat this threat against private enterprise may be brought to bear in checking the cooperative movement, but an intelligent presentation of the facts to the public gives promise of the only real avenue to relief.

b. Recognizing that cut price competition of any type is injurious to everyone, that it hurts the customer and retailer in the long run just as much as it does the manufacturer and distributor, it is recommended that profits be protected by placing all appliances under "fair trade contracts" wherever possible.

c. Industrial selling, or the "I can get it wholesale for you" racket has been outlawed by trade diversion laws

in nine states. Recognizing that "industrial selling" and the selling by the "discount" specialist result in diverting trade from established retail channels, it is recommended that we align ourselves with other trade groups and do all in our power to hasten passage of the "California Trade Diversion Law," Assembly Bill 1353. Pending the next meeting of the legislature, manufacturers doing business in our territory are urged to declare themselves now as to their intentions toward industrial buying or the selling to "discount" houses, so that legitimate dealers may guide themselves in establishing sound product connections.

d. Appliance selling through commissary, post exchange and ship's service is recognized as a long-standing community problem which probably cannot be eliminated. It is therefore urged that all dealers unite on some uniform policy for handling given sales through these agencies to the end that, if discounts are necessary, they be kept at a minimum which is fair to the agencies concerned.

e. Distributors who allow unauthorized individuals to purchase appliances "over the counter" are endangering price maintenance. Recognizing that the matter of "who is entitled to a discount" is one for distributors themselves to determine, it is strongly recommended that in the interest of all dealers, wholesalers should establish and maintain a uniform sales policy with regard to "over the counter" selling.

f. It is strongly recommended that the electrical industry as a whole should do all in its power to urge the government to establish and maintain as a policy, the present tendency to dispose of surplus materials, insofar as possible, through legitimate channels, rather than allowing such surplus materials or supplies to get into the hands of speculators. In anticipation of the ultimate release of surplus appliances, it is urged that they be disposed of only through regular established industry channels.

3. Former Dealer Practices That Need Correction:

a. The following discount policies are recommended: (1) No cash discount should be allowed; (2) No premiums of any type, including trading stamps which are a form of discount, should be allowed; (3) No discount should be given to any person for any reason, except, (4) purchasers of multiple units should be allowed a discount for the reason that ordinarily the expenses connected with such a transaction are less than the proportionate expense on sales of single units. Rate of discount to be determined later.

b. In recognition of the practice of some firms of considering a 90-day account as a "cash sale" while others have charged interest on such transactions, it is recommended that all dealers unite on some uniform policy in connection with such accounts.

c. Trade-in allowances, if inflated, amount to giving a discount. Therefore the following procedure is recommended as a uniform policy: (1) All trade-in allowances should be based on the market resale value of the appliance in question, less cost of reconditioning if any, total overhead connected with its sale, and a fair net profit to the dealer. (2) while it is recommended that no trade-in allowances be made on merchandise other than the type being sold, it is recognized that this policy cannot be made uniform; therefore if such transactions are made, it is recommended that the same formula for allowances as set forth in the preceding point, be used. (3) Recognizing that a practice of guaranteeing a definite trade-in amount on the purchase of an electric refrigerator has developed in the present sale of ice boxes, it is strongly recommended that this practice be discontinued as not being in the interest of sound business operations.

d. While term selling is controlled by regulation W, it would appear somewhat futile to establish term selling recommendations. But it is strongly urged that when and if this regulation is revoked, reasonable, uniform policies in keeping with the over-all economic situation at the time be uniformly adopted.

e. Advertising of appliances should be consistent with merchandising policies. Therefore the following recommendations are urged as uniform procedure: (1) No misleading statements should be included in connection with any appliance advertising copy; if such instances should occur, the closest cooperation should be maintained with the Better Business Bureau in its efforts to eliminate unethical and misleading advertising. (2) Advertising of trade-in allowances should be general in wording and never specific in amount, nor should a trade-in allowance be included in the net sale price of the advertised merchandise. Examples of approved statement would be: "Liberal trade-in allowance"; examples of unapproved statement, "$5.00 for you old ——," or "Sale price —— dollars and your old ——."

f. Competition between stores of the same class as to percentage or amount of compensation for appliance salesmen is recognized as a practice which could lead to labor piracy and to unwarranted selling expense. It is therefore urged that additional study be given to this problem with a view to working out recommended compensation programs which might be reasonably uniform for appliance dealers of similar classifications.

4. Appliance Service Policies:

a. Recognizing the need of establishing policies and practices which might

What the Planning Committee Was

It had its inception at the annual conference of the Bureau of Radio and Electrical Appliances of San Diego County last November when by unanimous action its establishment was authorized. The personnel of 25, including the chairman, was selected with great care to see that all phases of the appliance industry were represented—distributors, department stores, furniture stores, chain stores, small city dealers, several stores from county communities and service organizations.

The full group met twice to determine policies regarding material to be covered and subcommittee details. It then split into four sections which commenced work independently on assigned problems. Over 500 man-hours of time went into committee meetings, with much additional time by individual members in preparation and research.

When all four subcommittees were ready, their findings were brought to the full committee sitting as a jury. Changes were made here and there until unanimous approval was obtained for the coordinated report printed herein. When read to the conference by Chairman Guasti, he emphasized that it was entirely recommendatory and not compulsive. Besides enthusiastic approval the conference voted to retain the full committee, urged all members of the bureau to align with one or more of the four subcommittees and continue the work, at least well into the time after appliances return.—*J. Clark Chamberlain, secretary-manager, San Diego Bureau of Radio and Electrical Appliances.*

contribute toward the goal of making appliance service "pay its own way" at all times, the following recommendations are made: (1) That only efficient technical men be employed; (2) that a listed charge for each item or service be established, with regular profit on parts comparable to national custom, such as "Radio Men's Service Schedule" for radio service; (3) that outside service charges be set to include time away from the store, plus a uniform car allowance; (4) that a regular charge be made for all estimates given, away from the place of business; amount to be credited if work awarded; (5) that the service department be credited at 10% above cost for all maintenance work performed, other than retail service.

b. One of the chief causes preventing service from paying its own way, is the giving of free service beyond the commitments established by the guaranty or warranty. Therefore it is recommended that: (1) Free service should be limited to 30 days beyond actual commitment established by the guaranty or warranty; (2) that a special uniform dealer guaranty be adopted, which would be signed in duplicate by the dealer and accepted by the customer as definitely limiting free service beyond the period stated.

c. While it is difficult to make uniform recommendations as to the scale of payment for various types of service personnel, and to establish any uniform schedule for car allowances, the following general policy is recommended: That the schedule of payment for efficient technical service men should be approximately one-half of the services charges, plus car allowances charged the customer.

d. In recognition of the impending problem of some day having many improperly trained or qualified men attempting to enter the appliance service field, it is recommended that study be given now to the problem of establishing some sort of control of service personnel to the end that the public may be protected as fully as possible against any attempt to do service work in the appliance field.

Dirty Linen

Each washes his own at self service laundry

Ernest and Frank Jani, co-owners of the Vermont Plumbers, Los Angeles, Calif., licked the sales problem of the war shortage of appliances by setting up a laundry where people could do their own washing—and the idea is a big success.

The proprietors of this highly successful prewar home appliance business secured 12 used washing machines that were restored to good operating condition by their washing machine expert, Frank Rasmussen. The machines were set up in a vacant store building where, for 60 cents an hour, a housewife can put her washing through one of the machines. Hot and cold water are furnished. The customer brings her own soap. A woman attendant is on duty to provide assistance and information.

This unique business is open during the evening as well as in the daytime and is running to capacity most of the time. Many of its patrons are men. Chauffeurs have brought their employers' clothes to be washed because commercial laundries could not get them done in the desired time. Some patrons arrive in taxicabs.

Besides filling an acute war need, this project has the additional advantages, from the postwar sales standpoint, of keeping the Jani brothers' customers appliance conscious and of building goodwill.

For 60 cents an hour at Jani Brothers self service laundry, Los Angeles housewives can solve an acute wartime problem. Here the attendant assists a customer

● Reno dealers, according to A. L. Pierce, new business department, Sierra Pacific Power Co., have continued to be active, although several of the smaller strictly appliance shops have closed. The key dealers, however, remain. Activity in repairs is heavy. Lemmon & Travers have enlarged their facilities for refrigerator repairs. Nevada Electrical & Machinery has added other lines. Saviers have recently conducted the Conservice School in cooperation with Westinghouse which was attended by dealers from all western Nevada. The power company staff is busy in patriotic activities such as Red Cross and other drives, salvage campaigns and in assisting military and dealers wherever possible. Pierce reports that the kilowatt-hour average per domestic consumer has continued to rise and was up to 1,930 kwh. in April. Even the population of Reno has increased slightly since the war.

● Meier & Frank, Portland's biggest department store, took a full page recently in the Portland newspapers to announce its postwar plans to build an "electrical city," devoting an entire floor to electrical appliances and wares. In the advertisement it announced that architects are already at work on the plans for remodeling of the floor immediately merchandise is available, and stated the store's purpose was to have "the largest array of washing machines, ironers, ranges, refrigerators, radios, sewing machines, frozen food cabinets and small appliances in the Northwest."

● Still Advertising the electric range is the Los Angeles Department of Water and Power. Its advertisements still talk of the *matchless* electric range and its cooking qualities, oven control, etc. Emphasis is on the postwar kitchen and that it be planned electric.

Revive Dealer Interest in Northwest

Forgotten men of industry given glimpse of the appliance and wiring expectancies for the future

DEALERS and contractors, 360 of them out of a total of 978 attendance at ten meetings in as many cities and towns in Washington state, were unanimous in commending the idea of bringing to them again a touch of the world they had lost with the war, the world of electrical appliances and wiring.

Some of the plans for after-the-war promotion by electrical manufacturers, wholesalers and utilities in the Pacific Northwest were disclosed at this series of regional meetings for electrical dealers and contractors opening in Mt. Vernon, Wash., June 5. The meetings, which were sponsored by the Utilization Section of the Northwest Electric Light & Power Assn., and chairmanned by C. E. Hess, Puget Sound Power & Light Co., who is section chairman, were the first meetings of this kind ever undertaken by the association. The Mt. Vernon gathering attracted 104 registrations, 55 of whom were dealers and contractors from 15 cities and towns of Western Washington from Bellingham to Everett, the others being utility, manufacturer and jobber representatives.

Hess, who covered that part of the program devoted to utility plans for working with dealers and contractors, stated that, if it were found to be economically possible, the company would not engage in merchandising of appliances anywhere in the territory but would leave this function solely to dealers. The company would, however, engage in promotional activities involving home service, promotion of adequate wiring among all elements of the building industry, lighting promotion in all fields, promotion of farm uses and expansion of the company's experimental laboratory for testing new applications.

D. B. Leonard, Pacific Power & Light Co., represented the manufacturers and distributors on the program, displaying advertising, pamphlets and other literature that are now being made available to retailers to help them plan their business for the postwar era. The national adequate wiring program for the building industry was presented by Arthur E. Schanuel of the National Adequate Wiring Bureau, New York.

The work of the association and the manner in which a united industry front could be made effective in joint promotions of electrical devices that will be sure to come were brought out by Ross B. McElroy of the Washington Water Power Co. Under the title *When the Shooting Is Over*, George W. Allison, formerly with EEI, now with the Puget Sound Power & Light Co., closed the meeting with an inspirational address, pointing out the many profitable opportunities for all branches of the industry if they would but plan in advance to get actively into the business as soon as the door would be opened after V-day.

Interspersed between these talks were demonstrations of new, and comparatively new, equipment that would find increased use in the country's peacetime economy, by Berkeley Snow, executive secretary of the association. New long tube and thin tube fluorescents, now being tested in the General Electric laboratories, were displayed through the use of wooden models. Circular fluorescents, likewise still in the laboratories of the lamp manufacturers, were shown in the same medium. The Westinghouse Precipitron for cleaning dust particles from air was demonstrated, as was polaroid and black light. In addition, the first public showing anywhere of a new application of Du Pont's silver base paint, used for a heating element on an interior surface, as developed in the Puget Sound Power & Light Co. Experimental Laboratory by C. W. Wildebour, also was shown and demonstrated.

The Seattle meeting, the second of the series, had over 200 registrations. Other towns covered in this first series of regional dealer meetings, which ran through June 16, were Olympia, Wenatchee, Okanogan, Spokane, Walla Walla, Yakima, Wash.; Lewiston, Idaho; and The Dalles, Oregon.

Arrangements have been made to publish next month a full resume of the material presented to these meetings in order that it may reach other dealers throughout the West.

● "HOME FREEZER" has been designated as the name to use by the industry for sub-freezing refrigerators for home storage of frozen foods. The refrigeration section, National Electrical Manufacturers Assn. at its meeting in Chicago, in April, decided upon this term because there had been no generally accepted term or phrase expressive of the product's function. The variety of terms being used is causing confusion. The "home freezer" is described as "the household type of low temperature, mechanically refrigerated cabinet used exclusively for the freezing and/or storage of frozen food." Most of the manufacturers of household electrical refrigerators also will be large producers of home freezers after the war, it is expected.

● UNIQUE advertisement offering to save from $125 to $500 on the food bill per year appeared in the Sacramento newspapers recently. The advertisement was unique in that it offered these savings to renters of frozen lockers if they signed up in advance for space in it and thus would permit the company promoting their lockers to obtain priorities for the construction of the plant. Highfill's Polar Food Bank, at Sacramento; J. N. Blair & Co., equipment and machinery contractors; and C. J. Hopkinson, a building contractor, jointly appeared in the ad. Offering yearly locker rentals in the lower tiers at $20 each and upper tiers $15 each, payable in advance, the ad contained a coupon asking for reservations and a copy of the locker agreement and particulars of rental contracts.

● RADIO receiving sets will again be manufactured by Westinghouse Electric & Mfg. Co., that organization has announced, after the war. The company discontinued making such sets in 1928. Its plans contemplate manufacturing standard receiving sets and frequency modulation, including phonograph combinations and, as soon as possible, home television equipment. One of the first companies to have a broadcasting station, that company also has applied for licenses for three television stations after the war in connection with its radio broadcasting stations at Boston, Springfield, Philadelphia, Pittsburgh and Fort Wayne.

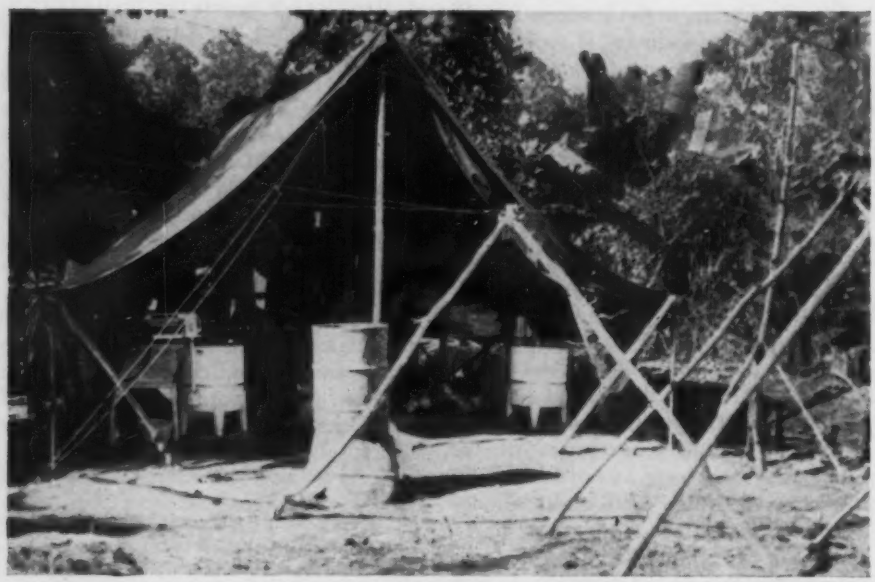
● A HOME canning manual has been prepared by Hotpoint company from authoritative information supplied by the U. S. Department of Agriculture. The guide reflects the benefits of intensive research aimed at solving new problems of conserving victory garden products to meet wartime food needs. It is arranged and indexed for quick use either by experienced canners or those unfamiliar with canning. A dealer's imprint can be placed on the manual as it is obtained from the advertising department of Hotpoint.

Market Week

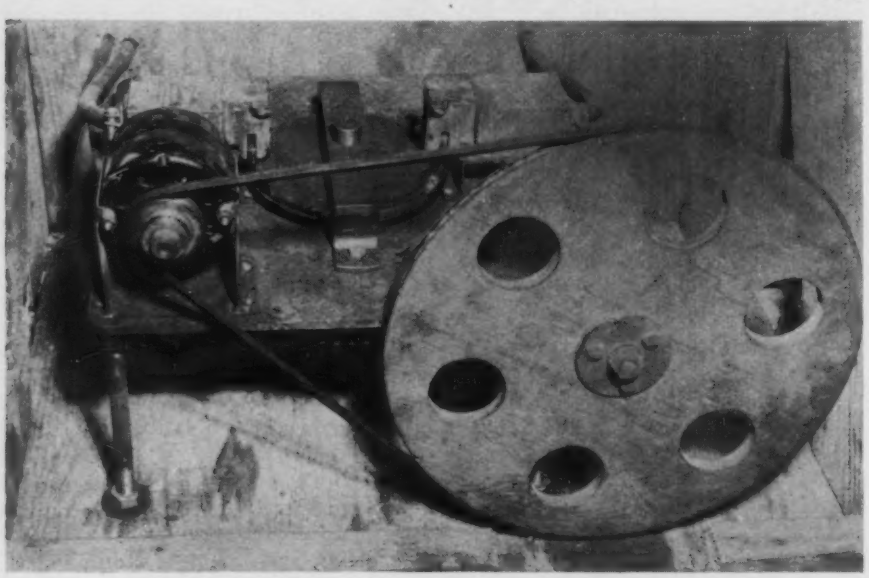
Electric ranges and water heaters are promised among the displays at the Fall Market July 24 to 29 at the Western Merchandise Mart, San Francisco. Restrictions on the sale of ranges and water heaters have been almost entirely removed. Some previously frozen stocks of these appliances have been released and it is likely these will appear on display for dealers to purchase at the market.

Although electric irons have been authorized for manufacture, it is still uncertain whether any of these will appear in time for the market. Meanwhile, giftwares aplenty are to be shown and also a return of many housewares which have been difficult to obtain but now are more plentiful.

● REFRIGERATOR standard testing methods, which make possible the comparison of the performance of various types of refrigerators, have just been approved by the American Standards Assn. The standard is derived from a thorough try-out in industry for several years and as a result has been approved as an American standard. It is already recognized as standard by the National Electrical Manufacturers' Assn. It includes the computing of food storage volume and shelf area.



Those washers you did not sell this year—here they are on Bouganville Island, under Jap shell fire, at the first electric laundry ever seen there; built by Seabees. This photo, taken by Martinez, CB photographer, was brought home by Dr. N. A. Bowers, Pacific Coast editor, "Engineering News Record," after a visit there. Below, on another island a commercial type laundry was found discarded, but rebuilt by Seabees. Originally operated on direct-current when an a-c motor was installed, this rig was made to alternate poles on the d-c supply



Piled Up Demand

Retail demand for 22,619,692 domestic electric appliances ranging from washing machines to toasters was found by U. S. Census investigators, who recently completed a third nation-wide survey of consumer requirements for WPB's Office of Civilian Requirements.

Washing machines, irons and mechanical refrigerators in that order were found to be most widely desired in the survey which, Director William Y. Elliott of OCR said, "indicates that when appliances become available again, there should be an orderly market rather than the wild buying rush which some people have predicted."

An estimated 3,684,996 families will be in the market for new homes, either built or purchased, the survey disclosed, with the average price estimated at $4,400. The housing demand, the report indicated, would remain strong over several years and would furnish a continuing demand for appliances.

An estimated 4,261,560 buyers would purchase washing machines, according to the survey. Other appliances and estimated markets therefor include: irons, 4,019,236; refrigerators, 3,827,048; electric ranges, 493,004; toasters, 3,200,348; radios, 2,682,276; vacuum cleaners, 2,389,816; fans, 1,487,368, and electric water heaters, 259,036.

Elliott said the report indicated that domestic appliances have been conserved well and that the indicated demand is for legitimate replacement needs or from households which did not have such appliances before the war halted their production.

● AN INVENTORY of appliance merchandising stocks is being taken very thoroughly by the contact representatives of the Los Angeles Department of Water & Power. The representatives are calling upon 400 dealers, merchant plumbers, department stores, chain store distributors and factory representatives. To do a thorough job, each inventory takes about two hours' time with a dealer, going over the items of a complete questionnaire and discussing it with him. When the inventory is complete ELECTRICAL WEST has been promised full report on it by R. H. Cockfield, manager of the residential section as guidance to dealers and utilities alike on what the trade is thinking about for future merchandising plans.

● ALOIS "LOUIE" HELLENTHAL for many years head of the housewares department at Bon Marche, Seattle department store, recently retired.

THE COST OF
Tomorrow's Peace

Today peace-loving Americans are united with thirty-three other nations in a common objective of destruction.

Millions of our fine, young men and women find themselves invading foreign lands in order that their own shores may be spared, and their free way of life preserved.

Their sacrifices will be great. Their job will be well done.

But what of the job they will expect of us when they have finished theirs . . . the job of turning their hard-won victory into a lasting pattern of peace?

Can we come up to their great expectation? We must realize that this is the last opportunity of our generation. We must do a better job of it than we did in the Twenties and the Thirties.

We have our backs to the wall, and the scars of World War I and a thirteen-year depression still are upon us. The final test of our way of life is at hand!

As we look over our shoulder into the immediate past, we see little to encourage us. But we also see much to make us pause. We see a tremendous fighting machine, created in a matter of months by the miraculous organization of our resources.

We, the largest of the peace-loving nations, have overnight become masters at the business of waging war. Today, as a result of the coordination of industry, labor, and government, we are producing ***for war alone*** as much as our total normal production for peace.

* * *

We have amply demonstrated our ability to harness the vast productive capacity we possess. Why cannot these resources, which we have organized so efficiently for the destruction of life and property, be directed toward the destruction of the causes of war?

May not the patriotic and emotional strength and the unity of action which have been stimulated for the purpose of winning the war be directed, at least equally well, toward the attainment of world peace and international harmony?

If they are not so directed, what lies ahead but another war? And how can America, in a world that is so rapidly shrinking in size, avoid involvement in ***any*** of tomorrow's conflicts?

International peace is an ambitious dream and its price is high, but the price of war is even higher. Our world cannot long survive the periodic waste of its human and material resources.

Our country can be the most potent single force in bringing about the international understanding that leads to peace, in developing the unity that will make the most of the ample resources nature has provided everywhere.

* * *

There is no unity in selfishness. There can be no unity if any one of the great powers fails to do its part in determining and eliminating from the world the basic causes of aggression.

These basic causes stem from greed and the suppression of opportunity for individual progress; for self-preservation is the first law of nature.

Mussolini's dramatic march on Rome in 1922 was made possible by disillusioned veterans of World War I who could find no jobs and whose future held no promise. Some of Hitler's most

determined followers came from the same ranks.

Men denied the opportunity to make a living, for themselves and for their children, are easy prey to false doctrines and dangerous "isms."

In any realistic appraisal of our domestic problems—economic, labor, racial—it is clear that we can solve them, not by waiting until we reach some utopian accord, but by making a series of compromises. We do this because we know how discord can impair the very roots of private enterprise, self-government, and self-discipline—the essentials of a dynamic democracy.

Similarly, peaceful reconstruction of our world economy depends on the ability of nations to reconcile their differences in a series of working agreements.

If we in the United States want lasting peace and if we want to preserve our democratic way of life, we must take over our full share of the task of initiating these compromise measures. Acknowledging our inescapable responsibility as the greatest economic and military power in the world, we must attempt to insure the free flow of world trade, and develop—with profit for both parties—backward areas abroad as well as at home. And we must do this by making all nations share the responsibility, not by allowing ourselves to be manoeuvered into being an international Santa Claus.

With our allies, we will have to see to it that the devastated portions of the world rehabilitate themselves as quickly as possible; that practicable and realistic trade and economic relations between nations are developed; and that the energies and productive capacities of these nations are set free to function in a climate that is favorable to the growth of free enterprise and individual initiative. As the most powerful economic force on earth, we have the most to gain and the most to lose at the peace table; and we must never forget that with our power comes responsibility.

We cannot hope to solve all of the problems of all nations—nor even all of our own—but our way can become the way for more of the world's humanity. Our strength can become the guiding spirit of the smaller nations.

* * *

In the development of a sound American foreign policy, let us take care not to attempt to control the destinies of other nations. Let us remember that we must set the example of self-determination of independent, free peoples.

Freedom is essential to international peace; and free competition—whether it be between individuals, between businesses, or between nations—is the mainspring, the synchronizer, and the preserver of freedom. For competition always is synonymous with private enterprise.

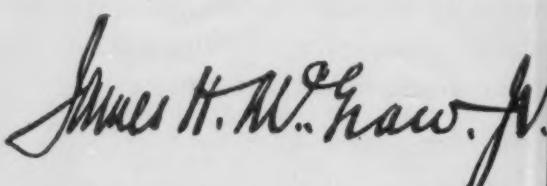
We are not a covetous nation. We have no territorial ambitions. Our international commercial aspirations are dominated by the conviction that we have a great stake in world unity and world prosperity. We know that we can no longer live apart from other nations and that we cannot ignore the fundamental elements which affect the well-being of other countries.

Our foreign policy must encompass a world of trade, and help develop it.

We dare not blunder in the execution of that foreign policy if the American way of life is to survive. A democracy resolved upon isolation is doomed in the world of tomorrow.

Let us resolve that out of this devastating catastrophe we shall emerge with fuller understanding and greater determination to build the kind of world which can materialize only if this country has the vision and the will to see it through.

We still are free to decide our own fate—still free to shape our own future. We still are free to preserve the liberty and happiness that has made our country the hope of the world.



President, McGraw-Hill Publishing Company, Inc.

How Much to Earmark for the Wiring

Quickly used appraisal chart enables home loan agency to determine amount that should be allotted for an adequate wiring installation

BECAUSE it was not earmarked for wiring, many a home loan sufficient to have included an adequate wiring job has been diverted to fancy finish or other home features before the house was completed. In talking with appraisers and those who negotiate a loan with a prospective home builder, the Pacific Coast Electrical Assn. has run across this situation. Even when money is loaned in sufficient amount for a good wiring job, there is no assurance that it will be installed. Besides, how is the appraiser to know how much to designate for an adequate wiring job?

The adequate wiring committee of the PCEA decided a simple chart might be very helpful to a loaning agency, bank or FHA, in setting up a definite figure in a home building loan to assure a lifetime wiring job of sufficiency for all electrical uses, and to earmark the loan for wiring if it desired. Experience of the industry was called upon, a preliminary draft of the chart made, this was reviewed and revised, and the chart illustrated on this page resulted.

Purposely it was designed to apply to the small home of around five or six rooms. The various major parts of a wiring system were assigned a proper proportion of points of value, with an approximate cost based on electrical contractors' ample estimates. Additional rooms, outlets, switches or bathroom heaters are easily calculated, too.

Having known beforehand from contacts with banks and loaning agencies of the need for such a chart, H. C. Rice, Southern California Edison Co., chairman of the PCEA committee, met with the top executives and department managers of the Bank of America in Los Angeles to outline the use of the completed chart. They were reported extremely interested and anxious to support the program. Given a copy of the chart, a copy of the Red Seal specifications, a copy of the booklets, *Electricity in the Home* of the Southern California Edison Co. and the new Westinghouse book, *Electrical Living in 194x*, they asked that enough of this material be furnished them to send one to the men in each of the bank's southern California branches in charge of home loans.

A similar approach is to be made to each of the other chain banking institutions with headquarters in Los Angeles and eventually through the individual Edison offices with each local bank. The plan will also be taken up with the building and loan associations and cooperation has been assured by the California Savings and Loan League, which will reproduce the chart and run a story about it in its magazine.

J. A. Hill, Pacific Gas and Electric Co., who will succeed H. C. Rice as chairman of the committee this fall, also plans to make this a part of the committee's activity and to make similar contacts in northern California with banks and loan associations.

Adequate Wiring Appraisal Chart

For Use in Determining the Loan Value of the Electrical Wiring in Residential Occupancies

Based on a typical one-story, two-bedroom home. Approximately 1,200 sq. ft. Cost about 6,000. Minimum wiring installation. (Red Seal Specifications.) Normal job considered 1,000 points. Electrical Contractor's Estimate $240 or 4% of building cost. On this basis each point is 24c or 18c.

Unit Value of the Various Parts of Adequate Wiring Specifications

	Points	Cost (Rigid Conduit)	Other Approved Methods
Main service, service entrance equipment, capacity for lighting and convenience outlets only	125	$ 30.00	$ 30.00*
Lighting: 15 lighting outlets on 2 branch circuits of No. 12 wire	125	30.00	22.50
Switches: 10 single-pole, two sets 3-way switches and wiring (each 3-way switch figured as 3 outlets)	125	30.00	22.50
Convenience Outlets: 21 convenience outlets on 2 branch circuits of No 12 wire	175	42.00	31.50
Door Bells: One front door, one service door. Bells, wiring, and transformer	25	6.00	6.00*
Range Wiring: Range circuit and receptacle; increased service and protective equipment	225	54.00	40.50
Water Heater, Heater circuit (heater not included)	100	24.00	18.00
Bathroom Heater: 1,500-watt heater and wiring	100	24.00	24.00*
	1,000	$240.00	$195.00

For Additional Wiring

For each additional lighting or switch outlet add	15	3.60	2.70
For each additional convenience outlet add	20	4.80	3.60
For each additional bathroom heater add	100	24.00	24.00*
For each additional room (light outlet, switch, and 3 convenience outlets) add	90	21.60	16.20

For the Appraiser:

* Cost is same in either case.

This size and value of home represents the largest percentage of new homes built. The electrical installations proposed are minimum under Adequate Wiring Standards. There will be two lighting circuits, two convenience outlet circuits, one installed 1,500-watt bathroom heater, wiring only for an electric range and wiring only for an electric water heater.

The "points" value is a fair division of the total cost into the component parts of this installation. The "points" given for additional outlets represent the greater costs in a home of larger floor area. These should be used for additional rooms.

Owing to local ordinance requirements in some areas regarding wiring methods permitted, the appraiser should obtain contractor estimates on the required minimum in areas where such restrictions prevail. Using these figures, the "points" value would still represent the proportionate values and should be used. Prepared by the Adequate Wiring Committee of the Pacific Coast Electrical Assn.

Not So Fast There, Mr. O'Dwyer

An answer to the answer to proposed elimination of No. 14 wire from a leader in future lighting

S. G. Hibben
Director of Applied Lighting,
Westinghouse Electric & Mfg. Co., Bloomfield

MY ATTENTION has been called to the story on page 62 of the May issue of ELECTRICAL WEST entitled *Abolish No. 14? That's Not the Answer* by John M. O'Dwyer, U. S. Bureau of Reclamation, Denver.

I cannot let this discussion rest contentedly without objecting in entire good humor to some of the ideas Mr. O'Dwyer expressed. Should you care to pass on my comments to him or do anything else you wish with them, it will be all right with me.

To Mr. O'Dwyer's objections to wrapping No. 10 or even No. 12 copper around terminal screws that have been more properly designed for No. 14 wire, I agree, but must point out that the basic fault lies with inadequate space and insufficient size of screw-head, etc., to properly handle an adequate size of wire. Reducing conductor sizes to meet terminal screw sizes is like the tail wagging the dog. If some further reductions of terminal fittings in 10c store types of devices would conceivably develop, then we certainly cannot carry this argument further and agree on still smaller conductor sizes.

Granted, the elimination of No. 14 wire will call for more copper in electrical circuits. This might also call for more insulation although, as to the latter point, I call attention to synthetic substitutes for rubber and also to thin wall coatings leaving chiefly the question of how much copper we must conserve. I submit that in a postwar period we are likely to have ample metal and that, even if the cost per pound of copper were to remain what it is today, it still would not add appreciably to the capital investment in the average residence. The copper that goes into a plumbing system involves more poundage and no one suggests cutting the water pipes down to half their present size in order to save weight.

I would certainly not fight with Mr. O'Dwyer on extended use of the three-wire system, even though we would have difficulty in separating circuits that terminate in sockets or convenience outlets and in some way to prevent putting the 120-volt devices across some 240 terminals. However, I cannot go along with a polyphase distribution system in an average residence, even though I have advocated polyphase distribution circuits, particularly three-phase-four-wire systems, in factories. We shudder at the contemplation of polyphase devices such as lamps, because the cost of changing over all of the designs and all of the machinery, and all of the terminal fittings, sockets, etc., would unquestionably be more than the cost of rewiring all of the 30,000,000 residences existent today.

Neither can I go along with the program of increasing voltages substantially beyond the 120-volt average figure. In the home this would involve design difficulties in appliances because of greater footage of fragile small resistance wire and, in the case of filament lamps, which still constitute over 95% of the illuminants used in residences, an increased voltage would mean a very much less efficient lamp and a very much more fragile one.

As far as 60-cycle frequency is concerned, I can partially agree with Mr. O'Dwyer that, if the Western Hemisphere were starting all over again to develop electrical service, we might reasonably choose a higher frequency but to do so now in anything but vehicles or installations not connected with general supply systems on the ground, would be terribly expensive, if not chaotic.

Practically the only illuminant that would appreciate a higher frequency would be the fluorescent lamp, whereby going to 400 cycles we might gain from 15 to 20% in lumen efficiency. However, the fluorescent lamp today represents only some 5% of the total number of regular lighting lamps in usage and it may be several decades before this percentage approaches half of the lamps in service.

We are just passing through a relatively minute but, nevertheless, troublesome change-over when moving from 50 to 60 cycle and aiming to reach country-wide agreement on this latter frequency. Even this slight change is troublesome enough, and I seriously question the wisdom of any effort to move away from 60-cycle frequencies in the general residential and commercial fields that we are discussing.

I can scarcely agree that the most effective form of house heating is by radiation from warm walls, ceilings and floors—not at least from what I know of the capital investment involved; the unknown effects on the human body; the fire and other incidental hazards and the problems of maintenance. Here again the operation would seem like the tail wagging the dog.

Finally, I could argue with Mr. O'Dwyer, as between gentlemen of good will, over the inference that utility executives and electrical manufacturers are smug and stubborn individuals with single-track minds who are "sot" in their convictions. Wiring systems, as well as hundreds of other problems, are subjects of continued open-minded studies by hosts of good engineers who constantly balance advantages against disadvantages and effect the best compromises that can be had. Frank discussions of any compromise can, however, be definitely helpful and I sincerely hope that men like Mr. O'Dwyer will keep on thinking about a subject such as adequate wiring which, as far as the consumer is concerned, has too long been dormant.

● A NEW SET of lecture charts for use from the platform and a 16-page booklet, both entitled *Electrical Guide to Your Postwar Home*, are being offered by the National Adequate Wiring Bureau for use of associations, leagues, bureaus, utilities or home service directors in educational class work.

● *Manpower Conservation With Light—Now and in the Future* is the title of a publication of the California Safety Council, Inc., 220 Bush St., San Francisco. Dramatizing the effect on war production of the increasing accident rate, particularly at night, the booklet is simple and tells the story with large headlines and graphic drawings. It advocates adequate lighting, as well as wider roadways and elimination of bottlenecks.

● A DIRECTORY of the American Council of Commercial Laboratories has been issued by that organization as a guide to the leading independent testing, research and inspecting laboratories of America. It lists the scope of activities of independent laboratories and the advantages derived from their services in solution of scientific engineering, testing and inspection difficulties. Copies are obtainable from the executive secretary, A. J. Nydick, at 63 Wall St., New York 5.

EMEA *Dope Sheet*

(Corrected by the author from original publication March, 1944, issue, pp. 70-72)

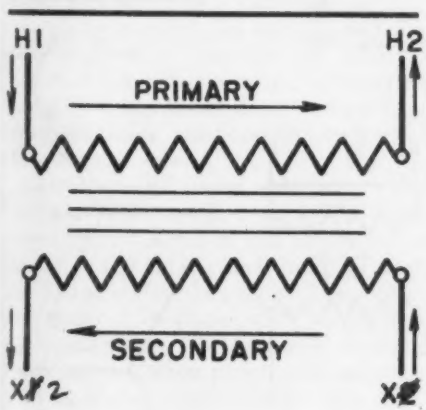
Phase Relation of Transformers

Primary winding vs. secondary winding, hooked up single-phase and three-phase star to delta, delta to star, star to star and delta to delta

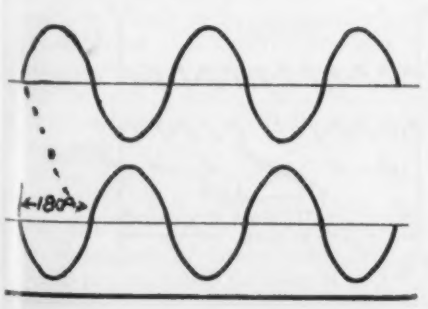
Roy Burnett
Electrical Engineering Dept.
Lockheed Aircraft Co.

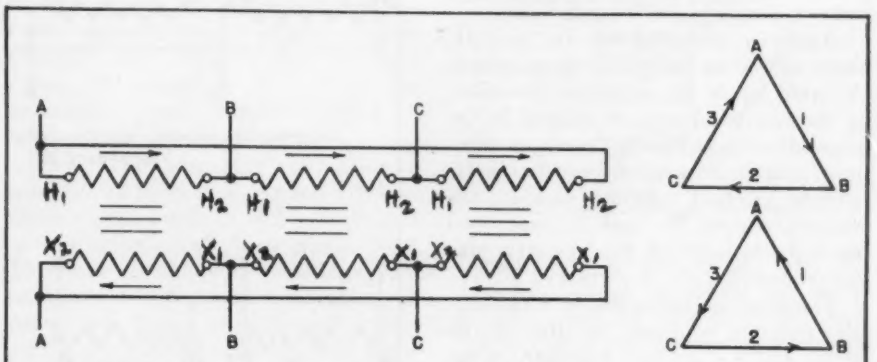
PURPOSE of this article is to demonstrate what takes place in a bank of transformers, hooked up according to the various standards. The cause of confusion in a man's mind regarding phase shift in a bank of transformers, is that he is thinking of the phase shift taking place within each transformer. To clear up this confusion, remember that the purpose of the iron core in the transformer is to couple inductively the primary winding to the secondary winding so there can be no power applied to one winding without inducing the same amount of power in the other winding.

The next important step is to em-

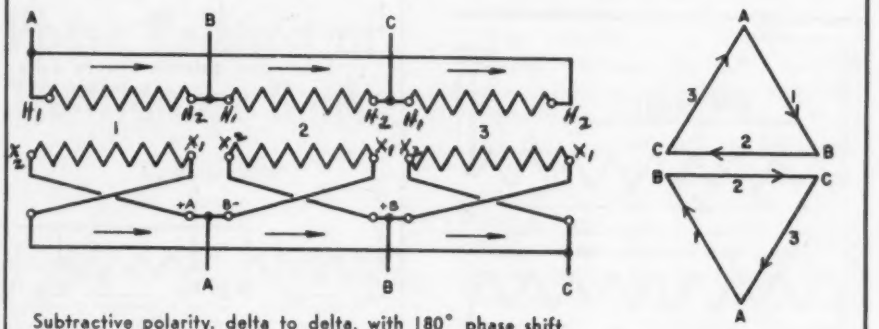


Additive polarity

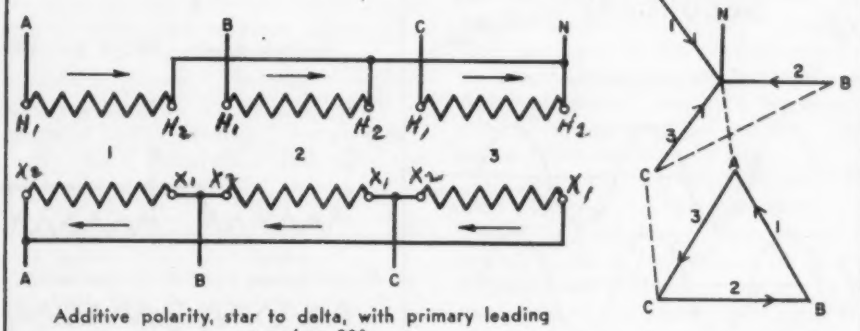




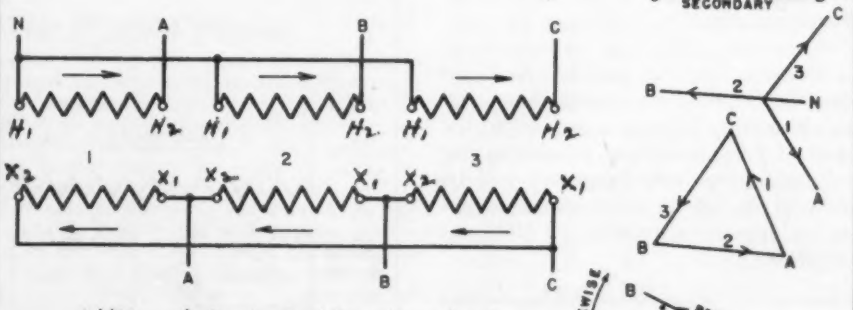
Additive polarity, delta to delta, with no phase shift



Subtractive polarity, delta to delta, with 180° phase shift



Additive polarity, star to delta, with primary leading secondary 30°



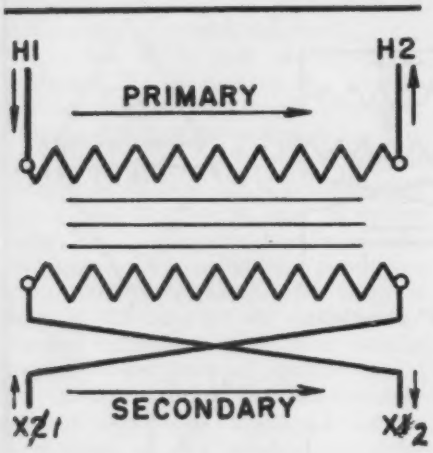
Additive polarity, star to delta, primary lagging secondary 30°

phasize the time element; in other words, two things happening at exactly the same time or two things, each happening at different times.

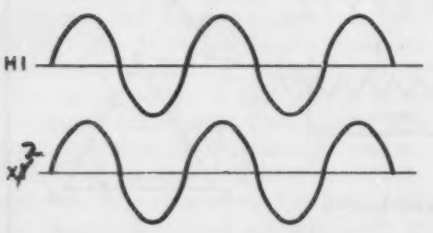
To bear out the statement previously made that the phase shift does not take place within a single transformer, look into a single-phase transformer.

Apply a potential on H_1 and H_2 there will be an inducted voltage across X_1 and X_2 in the opposite direction, if the two windings are wound in the same direction. This is known as *additive* polarity. In other words, if H_2 and X_1 are tied together, measure the voltage across H_1 and X_2 and you read the voltage of the primary plus the voltage of the secondary.

The diagram below shows a *subtractive* polarity hook-up; in other words if H_2 and X_2 are tied together, measuring the voltage across H_1 and X_1, the ultimate would be the greater voltage, less the lesser voltage.

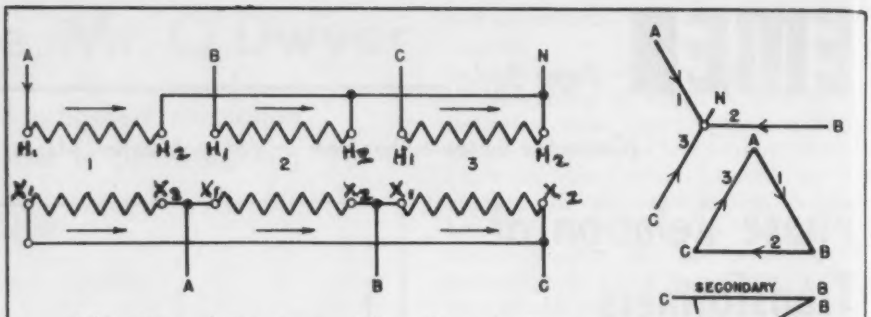


Subtractive polarity

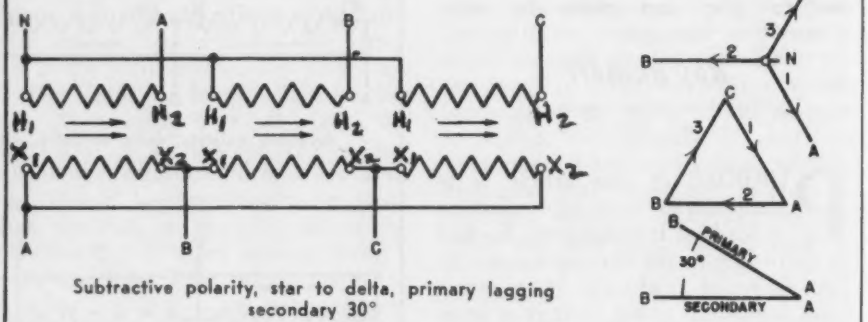


Next, review one of the laws of inductance, which tells that, if two conductors are placed in proximity to each other and in parallel, with no metallic connection between them, and an alternating voltage is applied to the ends of one conductor, an alternating voltage of the same frequency will be induced in the second conductor, but in the opposite direction, or 180° out of phase.

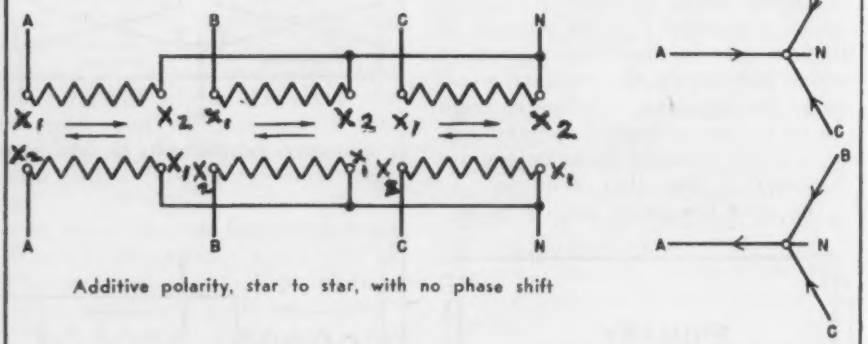
Single-phase transformer, showing diagram of hook-up for one-half voltage, and twice the current, and hook-up for twice the voltage and half the current; bottom diagram at right



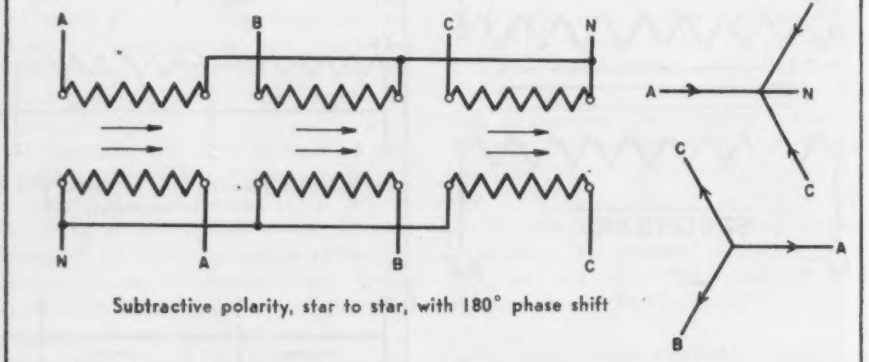
Subtractive polarity, star to delta, primary leading secondary 30°



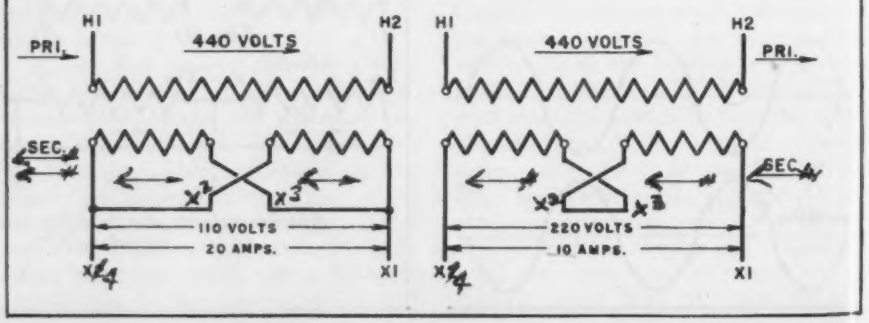
Subtractive polarity, star to delta, primary lagging secondary 30°



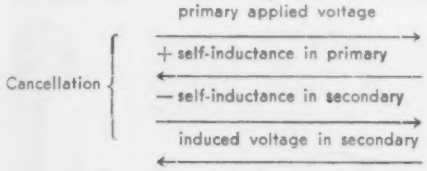
Additive polarity, star to star, with no phase shift



Subtractive polarity, star to star, with 180° phase shift



In the primary winding of a transformer, the current is very low when there is no load connected across the secondary, because the counter electromotive force induced into the primary winding by what is known as self-inductance, or reactance, is 180° out of phase, or is in the opposite direction of the applied voltage. If a load is connected across the secondary winding, a current will start to flow, but will flow in the opposite direction to the primary current. The secondary current also induces a back pressure, or counter electromotive force, which is 180° out of phase with the voltage induced by the primary current. The diagram below will show that the current in the secondary tends to cancel out self-inductance in the primary,



and the primary current tends to cancel out self-inductance in the secondary winding, which in turn shows that primary current varies as the load varies across the secondary winding.

Step by step, it has been shown that the only phase shift that takes place in a single transformer is the 180°, or reverse action of secondary to primary, which is the same thing as exchanging two wires of any simple two-wire circuit, and which can be corrected by exchanging back again. So, the difference between an additive polarity transformer and a subtractive polarity transformer depends on which way the leads are brought out of the transformer case.

The type of phase shift next considered is not so simple as the type just covered. First, it will be necessary to show the three-phase hook-up with no phase shifts, then show three-phase hook-ups with phase shift. Direction of rotation must be assumed, bearing in mind that each phase goes through 360 electrical degrees every cycle. So, for an arbitrary direction, assume a clockwise rotation.

After analyzing the different standard hook-ups, let us discern what is meant by phase shift; when and where it takes place. Look at the first star to delta hook-up diagram again and note that the star is hooked to a four-wire circuit, while the delta is hooked to a three-wire circuit.

Note again the primary of transformer No. 2 is connected from line B to neutral, which is in phase with the secondary of transformer No. 2, which is connected to lines B and C. Therefore, the peak voltage between lines B and C occurs at the same time the primary voltage peaks between primary line B and neutral; not when the primary voltage is peaked between primary lines B and C.

Then the phase shift is the result of two things happening at different times, or the voltage of the primary through two transformers peaking, either 30° ahead or 30° behind the secondary peak voltage, which is across only one transformer.

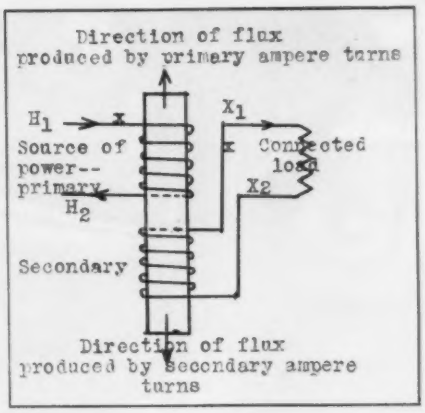
The three-phase star connection is used where there is a demand for three single-phase loads of different values, or an unbalanced three-phase load. The neutral conductor will carry the unbalanced current brought about by connected loads of different values across the different phases. The three-phase delta hook-up is best suited for a balanced three-phase load.

Phase Relation of Transformer Banks

F. V. Gillum
Pomona

IN order to obtain a working knowledge of the phase relations existing between the primary and secondary terminals of transformer banks it is first necessary to have a clear conception of what is meant by polarity of a transformer. Having determined the polarity, the relative phase relation of its high- and low-voltage terminals is known. The phase relation existing between a-c voltages and currents is best represented by vectors.

By AIEE standardization rules the high-voltage terminals of a transformer are designated H_1 and H_2. The low-voltage terminals are designated X_1 and X_2. The order in which the terminals are marked is such that "when H_1 and X_1 are connected together and voltage is applied to the H_1-H_2 winding, the voltage between H_2 and X_2 shall be less than the applied voltage."



The polarity of a transformer is "subtractive when H_1 and X_1 are adjacent, additive when H_1 is diagonally located with respect to X_1."

In the illustration is represented a transformer supplying a load. Its polarity is subtractive and the currents flowing, shown by the arrows, are in phase. Note that the instantaneous current flow, shown by the arrows, produces in the iron core a flux or magnetism, in opposite directions. Actually in a transformer, the primary load current flux cancels out the secondary load current flux. The magnetism existing in the iron core is that produced by the exciting current of the transformer and for the purposes of this article may be considered as having no relation to any load current that may be flowing.

Inspection of the sketch shows current "flowing *in* on polarity (primary) and *out* on polarity (secondary)." This is a useful rule to remember and will assist materially in analyzing all problems concerning the phase relations of transformer banks.

Editor's Note: In being passed through several hands from the author to the Electrical Maintenance Engineers Assn. of Southern California and from its "Dope Sheet" to the printers and engravers, several errors crept into the original publication of this article in the March, 1944, issue of ELECTRICAL WEST. Keen-eyed readers from all parts of the West called it to the attention of the editors, proving that, though often silent, the readers do peruse the magazine thoroughly and intelligently. One reader sent in a kindly article to correct the original mistakes, but ELECTRICAL WEST felt it only fair to let Roy Burnett correct the article and allow its republication.

Because his comments and drawings further clarify the subject, the accompanying portion of an article by F. V. Gillum is also published to supplement the Burnett article above. This latter article also contained a redrawing of the diagrams used by Burnett together with four supplementary ones, but space does not permit publication of these.

● HANDBOOK of Interior Wiring Design, prepared by an industry committee representing all branches of the electrical industry, is about to be revised in several of its sections, particularly those concerning residential wiring and farm wiring. It is also planned to bring the standards up to date for application in all types of postwar building construction and modernization. E. A. Brand, of Buffalo Niagara and Eastern Power Corp., Buffalo, has accepted reappointment to the chairmanship. A. C. Bredahl, Westinghouse Electric & Mfg. Co., Pittsburgh, is the secretary.

Who

Union Pacific Railroad ticket office in downtown Denver, Colo. Engineered and sold by J. I. Wright, lighting engineer, Public Service Co. of Colorado, Denver. Fixtures manufactured and installed by Schockett Electric Co., Denver, using General Electric lamps, ballasts and watch-dog starters.

At the work counter—the need

High-level illumination for easy seeing of small print detail on tickets and time tables in order to improve accuracy and hasten preparation of travel tickets.

Installed

Special flat cove containing a continuous line of fluorescent lamps immediately over the work counter. Cove made to blend with the frame of the illuminated map above, protruding over work counter, yet at a height below the eye level of clerks.

Results

Improved visibility on work counter with this local lighting was so satisfactory that the Railroad began the relighting of the entire sales room, described below.

LIGHT FOR A TICKET OFFICE

fluorescent

Installed

Design was concentrated to follow the customers counter space and the general office area. In replacing incandescent indirect units with 71 four-foot fluorescent units, each containing four 40-watt lamps, they were placed directly above the counters. The main counter unit, 84 ft. long, has four laterals extending into the office space. Instead of conventional suspension at the center of each section, hangers are located at the ends, allowing one hanger to contribute to the support of two sections. Suspension is provided every four feet.

Because installed to a suspended ceiling, a continuous angle iron, acting as a fixture bar, was installed in the furred space, drilled and tapped, to which the fixture supporting rods were threaded.

Diffusing glass with a high transmission factor was used to enclose a standard tubular open type fixture. Wattage was practically a watt for watt replacement of the incandescent installation—a total of 11,360 watts.

Aside from the utilitarian aspect, the placing of the continuous lighting units parallel to the room and with laterals paralleling the counters, makes for a consistent decorative effect in keeping with the simplicity of the modern interior and functional design.

Results

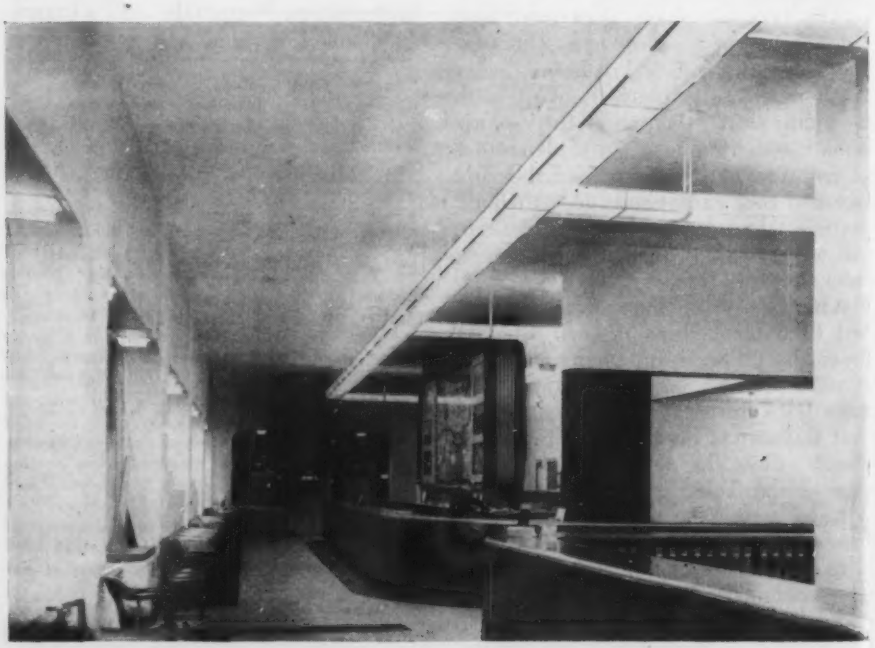
Illumination level on the counter, 45 to 55 f-c. average. Personnel working in the office all are pleased, have made none of the customary criticisms expected from a new installation.

The Need

Better visibility at the service counters for perception of time tables and fine print data in schedule books, as well as improved appearance of the entire ticket office.

Conditions

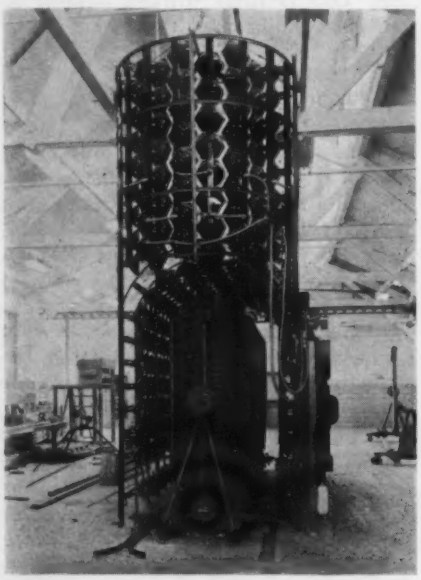
Previous installation was 20 indirect fixtures, each with 300-watt incandescent lamp. Ceiling height, 15 ft. Lighting level only 5 to 7 foot-candles throughout 6,000 sq-ft. area.



Surrounded

Infrared on all sides, as well as ends, top, bottom

The problem was to provide an even temperature of between 250 and 300° F. for all sides of a large metal life raft in order to dry the paint quickly and evenly. This necessitated design of the near infrared equipment in such a way as to enclose completely each life raft as it was being dried. On this problem worked the engineers of Weber Showcase & Fixture Co., Leo J. Meyberg Co., Los Angeles, distributors of the Fostoria equipment, and Quality Electric Co., electric contractors making the installation. The result has been the installation of the West's biggest infrared installation at the plant of Weber Showcase & Fixture Co., Los Angeles. Two of the units have been installed and a third is to be added soon.



Infrared tunnel with both end gates raised as life raft on dolly is moved in. Lamps in pit heat underside, too

The products to be dried are metal life rafts and airplane drop tanks, being turned out for war production. In order to cover them completely with the rays of the infrared lamps and reflectors, it was necessary to enclose not only the sides and top but bottom and both ends. The problem was solved in an ingenious manner through the use of end gates which can be raised to permit the entrance of the unit to be dried into the tunnel on a dolly. The gates are then lowered and completely enclose it.

Each of the tunnels contains a battery of 1,056 lamps, ranging in size from 250 watts to 500 watts. Normal operating temperatures in the tunnels range from 240° to 250°, although a maximum surface temperature of over 300° can be attained on the 16-gauge metal used in the construction of the rafts.

Drying time is about 20 minutes, exactly half the time required formerly in an electric oven. Weber company also has found that the near infrared characteristically dries more evenly since the heat penetrates the metal from all sides at once, resulting in a harder, more durable finish for these sea-going life rafts.

Although used now for war production, the Weber company plans to convert the equipment for the processing of its peacetime products, after the war is over.

Dark Laziness

Dark woodwork, dark floors and trim, dark furniture all reflect man's laziness instead of intelligence. While H. L. Logan, illuminating engineer, Holophane Co., who spoke to IES meetings in San Francisco and Los Angeles recently, did not make this direct accusation, he implied it when he indicated how far off the range of brightnesses and reflections in an interior are from the relationship outdoors in nature. In nature, one-third of the light reaching the eye usually comes from the lower half of the field of view.

At the greatest extreme in nature the amount of light from the lower field of view may be as low as 10% but never greater. The maximum extremes in brightness in nature, he found by patient research and tests, to be 39 to 1. Contrast brightnesses in interior lighting measured with the same care and accuracy showed many to be in the range of 970 to 1 and the maximum he found was 6,500 to 1.

The cure is to use lighter colors and finishes throughout an interior. The reason darker finishes were used was to hide dirt. Thus, man's dislike of keeping light surfaces clean results in interior finishes which are of far too great contrast for the eye to accommodate. Light furniture, light walls, even light floors, besides reflecting more of the light input into a room, would bring the relative brightnesses of all objects within the field of view to tolerable ratios.

Logan has even developed an instrument for measuring simultaneously the brightnesses in all of the fields of view and expects soon to have a great deal more data on this important factor in seeing.

Star and Mesh

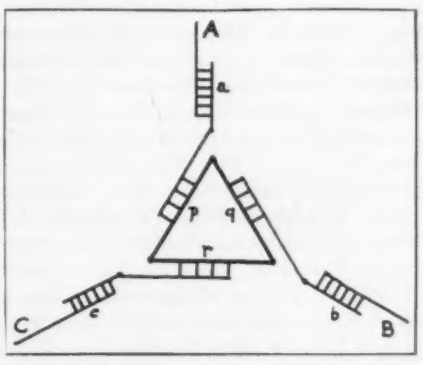
For a motor that comes up to speed with the greatest of ease, Frank Andrews, Andrews Magneto & Motor Works, Modesto, Calif., advocates that something be done with the now almost forgotten combination star and mesh groupings. He writes:

"Many of the old time motor men, when there was the swing from two-phase to three-phase, have used the combination star and mesh groupings to make the change from 2,400 volts, two-phase to 440 volts, three-phase. This combination works best on ten poles or more. Under ten poles necessitates special coils, one size of wire and number of turns for the star group and a different size for the mesh or delta group. On the ten-pole motor six poles are used on the star connection and four on the delta.

"On account of the shortage of motors, I recently unearthed an old timer. In fact, it was one of the first motors to come to California. This motor was badly needed to work beside another late-model motor, direct-connected to a pump on a gold dredge. After reconnecting this old motor, star and mesh, it started so smoothly and easily compared with the conventional hookup that all the operators noticed it and remarked about it. Had it not been for the fact that both old and new types were side by side, it would have gone unnoticed. In fact, this was the first time I realized its easy and smooth starting value.

"Therefore, I am passing it on to the younger motor men as I have not seen it in the later textbooks. In Thompson's *Polyphase Electric Currents*, 1895, it is stated, 'Such combinations were first suggested by Dobrowolsky with the object of gaining in a motor a more uniform torque at different points of the revolution than would be attained by a set of coils in three phase only.'

"It is my belief that this winding should be used in a number of cases where frequent and noiseless starting is needed."



Reconversion Signs

Civilian production slow, but some items in prospect

SIGNS of reconversion to more civilian production have increased in the past two months. Holding it up in many instances is a critical shortage of one or two materials or component parts. Fractional horsepower motors will probably hold up production of any appliances requiring these until the motor situation is in the clear. So far aircraft requires so many motors and generators that the prospect is not immediately bright. Manpower with which to manufacture without drawing upon the manpower needed in war industry is another critical obstacle. This became evident in the electric iron program which is now definitely started.

● SOME METALS HAVE BEEN RELEASED to manufacturers for making of working models of planned postwar products, and tools, machinery and dies for civilian production may now be purchased from existing surpluses listed with WPB and DPC. Meanwhile, the Office of Civilian Requirements is making numerous surveys to determine what articles are in most critical need. The Bureau of Census has found that, among eleven appliances, washing machines are now in greatest demand; electric irons and mechanical refrigerators next.

● IN THE WEST COAST AREA, where ship fabrication is slowing down and aluminum and magnesium plants either shut down or curtailed in production, the Maritime Commission is again seeking small plants to manufacture or fabricate ship parts.

● ELECTRIC IRONS should reach the stores in about three months, WPB reported in mid-June. It has authorized to be made all but 240,000 of its 2,000,000 electric irons set as a yearly quota. List of manufacturers so far authorized include: Chicago Flexible Shaft Co., Samson United Corp., Proctor Electric Co.. Son-Chief Electric, Inc., General Electric Co., Ontario, Calif., plant, American Electrical Heater Co., Gilson Electric Mfg. Co., Manning-Bowman & Co., National Stamping & Electric Works, the Nelson Machine & Mfg. Co., Lawrence & Stein Co., Waage Mfg. Co., Westinghouse Electric & Mfg. Co., Mansfield, Dominion Electrical Mfg. Co., New York Pressing Machine Co., Cissell Mfg. Co., Knapp-Monarch Co., Metalware Corp., Reimers Electric Co., Rutenber Electric Co., Verplex Co., Waverly Tool Co., Winsted Hardware Mfg. Co. In general, the proportion of domestic to commercial models is about 1% and 99% domestic and around 85% of the domestic models are automatic.

● ELECTRIC RANGES may be authorized made some time this year. A quota of about 88,000 is expected. A similar number have already been made under the emergency program. About 68,000 are to go to civilians as replacement for essential needs and to outfit new war housing. The remainder will go to fill special orders of the military. Three-element, apartment type ranges, which are already in production, may be available the latter part of the year. Some production of standard four-element models may be authorized. As with irons, no rationing will be required; distribution will be through normal channels.

● ELECTRIC FANS to the extent of about 100,000 may also be authorized to supply the most essential military, hospital, institutional and industrial needs. None of these 12- and 16-in. fans will be available for home or office, WPB said.

● REFRIGERATORS, however, were given a stricter freeze than ever by WPB because of the dwindling stockpile, which has dropped to 15% of its level early in 1943 when production halted. Only the most highly essential military and public health needs can be met now. Ice box production has been set at 821,000 units, four times as great as last year.

● WASHING MACHINE men met with WPB, discussed the possibilities of return to civilian production. Raw materials seem to be available but lack of component parts, especially small electric motors, ball bearings, oil seals, synthetic rubber for wringer rolls and hose and packing materials, all make the outlook gloomy. Repair parts, however, are being made to keep the existing washers in operation. The industry advisory committee also discussed distribution of repair parts and manpower for service shops. To establish the essential status of repair men the industry was advised to discuss the situation with the civilian requirements representative in WPB regional offices in order to have them classified as "locally needed."

● EVAPORATIVE COOLERS of certain types may be manufactured under a recent authorization. These are for use in homes of West Coast war workers who are forced to live under hot arid conditions because of the location of certain war plants. Procedure is set up under limitation order L-38, direction No. 1, for prospective manufacturers.

● FRACTIONAL HORSEPOWER MOTOR production programs are being met at present but the industry advisory committee pointed out that additional motors probably will not be available for civilian use in view of the large military orders with which the industry is faced. A-c motors are more critical than others. It was suggested to WPB that replacement motors for MRO purposes be tagged or marked in similar manner to radio tubes.

● PRICING OF RECONDITIONED fractional horsepower motors was given a new formula by OPA, effective June 26. The new regulation increases ceiling prices in order to bring into the market as many such motors as possible. Low ceilings worked against extensive rebuilding.

● INTEGRAL HORSEPOWER ELECTRIC MOTOR manufacturing industry advisory committee urged that the sale of surplus motors in foreign markets be encouraged to cut down the surplus ultimately to be thrown on the market against which new motor manufacture would have to compete.

● FLOODLIGHTS were put on an inventory basis by WPB to distributors of electrical goods. Inventory is furnished distributors to facilitate prompt delivery to military establishments and war plants. Standard floodlight sizes only may be obtained by filling out form 547. Once established the inventory can be replenished by extending preference ratings.

● FLUORESCENT LIGHTING fixture manufacture continues to be curtailed because of limited available production of ballasts and transformers. Greatly increased requirements for transformers for military uses will set the pace at which manufacture of fixtures will be allowed. Previously order L-78 had been amended to cover the manufacture and distribution of fluorescent lighting fixtures of the portable or attachable overhead suspended type such as are commonly called kitchen units or designed to be plugged into an outlet.

● CONSTRUCTION PRICE CONTROL, like a bear that has hibernated for the winter, emerged again when OPA recently brought out changes to MPR-251, which contractors had considered a dead animal. Protests to congressmen brought forth a conflict of opinion from OPA and from the National Electrical Contractors Assn. which had dropped a suit to enjoin the OPA from enforcing this order. At time of press the issue still is undecided.

Coolers Increase Egg Production

California CREA tests to be continued

CONTINUING experiments in the cooling of poultry houses with evaporative coolers indicate that egg production may be increased in hot climates, according to data released by the California Committee on the Relation of Electricity to Agriculture. Tests have been conducted for a second year on the Don Cruikshank ranch in Imperial Valley with substantially the same results as in the initial experiments.

For the months of June, July, August and September, the average number of eggs laid per bird was 33.52 for hens in the cooled house as against 26.48 for hens in the uncooled house. These particular hens were under test for the second year. In the case of pullets, the increase was from 30.42 eggs per bird in the uncooled house to 47.26 eggs in the cooled house.

Four houses each 18x20 ft. and stocked with 150 birds were used. Two of the houses were cooled with ordinary evaporative coolers and the remaining two were checks. Results of the tests are shown in the accompanying table. During the tests temperatures ranged between a high of 96.3 and 110.1°. In the cooled houses the temperature was maintained below 100° at all times.

Electric energy consumption for the two cooled houses was 37 kwh. for June, 99 kwh. for July, 86 kwh. for August and 65 kwh. for September. The eggs produced were not weighed and were not graded as to size.

The experiment is being continued during this year with three houses—two cooled and one as a check. The size of the houses has been increased to 20x36 ft. and the number of birds to 225. One of the cooled houses will be enclosed as in the previous tests and the other will be left open similar to the check pen. These experiments will determine whether the coolers are sufficiently large for the bigger pens and also whether it is necessary to enclose the house to keep it cool.

Egg Production in Cooled and Uncooled Poultry Houses

Month (1943)	Number of birds Average	Died	Grain	Mash	Grain and mash	Limestone	Eggs laid per bird Number	Per Cent
1A Hens—second year in test—cooled								
June	144.5	1	2.08	3.38	5.46	.14	13.58	45.3
July	142.8	2	2.17	2.95	5.12	.10	9.63	31.1
Aug.	140.6	3	2.20	2.84	5.04	.14	6.27	20.2
Sept.	138.3	1	2.17	2.42	4.59	.13	4.04	13.5
			8.62	11.59	20.21	.51	33.52	27.5
2A Hens—second year in test—not cooled								
June	144.1	1	2.08	3.13	5.21	.14	11.60	38.7
July	143.0	2	2.17	2.92	5.09	..	8.59	27.7
Aug.	140.5	2	2.21	2.68	4.89	..	4.09	13.2
Sept.	138.7	2	2.16	2.11	4.27	..	2.20	7.3
			8.62	10.84	19.46	.14	26.48	21.7
3A Pullets—hatched Spring 1942—not cooled								
June	142.3	1	2.11	3.28	5.39	.13	15.17	50.6
July	141.5	1	2.19	2.95	5.14	.11	8.57	27.6
Aug.	139.0	3	2.23	2.48	4.71	.13	3.96	12.8
Sept.	137.5	1	2.18	2.08	4.20	.10	2.72	9.1
			8.71	10.73	19.44	.47	30.42	24.9
4A Pullets—hatched Spring 1942—cooled								
June	142.0	2	2.11	3.57	5.68	.14	18.84	62.7
July	139.3	3	2.23	3.68	5.91	.12	14.79	47.7
Aug.	136.7	2	2.27	3.03	5.30	.12	9.09	29.3
Sept.	134.5	3	2.23	2.12	4.35	.13	4.54	15.1
			8.84	12.40	21.24	.51	47.26	38.7

Light Benefits Turkeys

TURKEY hens subjected to artificial lighting produced more eggs and earlier eggs than birds not so exposed in tests conducted by Dr. V. S. Asmundson of the University of California Division of Poultry Husbandry under the auspices of the California CREA. These tests were devised to determine light intensity and the length of time that light should be used.

Five test pens 16x18 ft. were used, each housing 10 hens. A total of 13 hours of natural and artificial light was provided by the use of artificial light in the morning. Lamps of 100, 60, 25 and 10 watts were used in four of the pens and the fifth had no extra lighting. The tests were begun in late November 1943 and were continued through May 1944. The first egg was laid on Dec. 27 in the pen with the highest lighting intensity as against Jan. 18 for the latest pen while the average date of the first egg was Jan. 3 in the case of the 100-watt lighting as against March 10 for the pen with no lights. The pen with the brightest lighting produced double the number of early eggs of the pen with no lights.

The results indicated that birds receiving the highest lighting intensity started laying first and laid the largest number of early eggs. Also it was shown that turkeys require approximately twice the light intensity shown by other tests as necessary to keep chickens in production during the winter months.

It is planned to repeat the tests with some pens with even higher intensity than that which was used in these experiments.

Home Appliance Care

SO much success has been enjoyed by a series of clinics on the care and maintenance of home electrical equipment which have been conducted in rural areas by the Home Demonstration Department of the Agricultural Extension Service and the Division of Agricultural Engineering of the University of California, that a new series is being devised for the fall of 1944.

This cooperative project was initiated with four two-day training meetings at which home demonstration agents were given instruction on the care and maintenance of home electrical equipment. A total of 43 agents representing all of the 32 counties having such service attended. The subjects covered during the meetings were fundamentals of electricity and electric wiring, care and repair of electric cords, care of electric motors and care of electric ranges, washing machines, ironers and refrigerators.

In six months the home demonstration agents held 745 meetings at which instruction was given to 9,829 farm women. An additional 150 meetings were to be held.

It is proposed to devise a new program of instruction and to repeat the training meetings this fall.

ELECTRICAL WEST

McGRAW-HILL COMPANY OF CALIFORNIA
68 POST ST. SAN FRANCISCO . 4

The all-industry magazine of progress, established 1887 and incorporating the "Electrical Journal," "Journal of Electricity, Power & Gas" and "Journal of Electricity." Contents Copyrighted.

EXECUTIVE AND EDITORIAL STAFF

James H. McGraw, Chairman of the Board
George C. Tenney, President and Editor
W. A. Cyr, Associate Editor
Wayne Snowden, Engineering Editor
(In military service)
Walter C. Heston, Engineering Editor
Peggy Boyer, Assistant Editor
R. A. Balzari, Publishing Counselor
Roy N. Phelan, Manager
Hans Hjorth, Typography

MEMBER AUDIT BUREAU OF CIRCULATIONS

ADVERTISING REPRESENTATIVES

Ralph H. Flynn, 330 W. 42nd St., New York 18
William B. Heaps, 520 N. Michigan Ave., Chicago 11
Roy N. Phelan { 68 Post St., San Francisco 4, DO 4600 / 621 S. Hope St., Los Angeles 14, MI 3873
Stephen H. Babcock, 2-144 General Motors Bldg., Detroit 2

EDITORIAL ADVISORY BOARD

UTILITIES: R. E. Fisher, Vice-President in Charge of Public Relations and Sales, Pacific Gas and Electric Company, San Francisco; J. A. Hale, Vice-President, Utah Power & Light Company, Salt Lake City; Glenn L. Jackson, Vice-President and Commercial Manager, The California Oregon Power Company, Medford (in military service); Frank McLaughlin, President, Puget Sound Power & Light Co., Seattle; L. T. Merwin, President, Northwestern Electric Company, Portland; W. C. Mullendore, Executive Vice-President, Southern California Edison Company Ltd., Los Angeles . . . MANUFACTURERS: J. H. Pengilly, Exec. Vice-Pres., Square D Company, Los Angeles (in military service); C. A. Dostal, Pacific Coast Manager, Westinghouse Electric & Mfg. Co.; A. S. Moody, Northwest Manager, General Electric Company, Portland... WHOLESALERS: J. I. Colwell, Northwest Manager, Graybar Electric Co., Inc., Seattle; N. W. Graham, Graham-Reynolds Electric Co., Los Angeles . . . CONTRACTORS: Lloyd Flatland, Globe Electric Works, San Francisco; S. G. Hepler, Arrow Electric Co., Seattle . . . DEALERS: H. H. Courtright, President, Valley Electrical Supply Company, Fresno; J. C. Chamberlain, Sec'y-Mgr., Bureau of Radio and Electrical Appliances, San Diego, California

Shasta Dam Power Policies

WITH dedication of Shasta Dam and power house on July 14, the federal government, in fulfilling its proper function of carrying out great public works for regional and national benefit, has brought to near completion some of the major units in California's Central Valley Project. This $333,000,000 development, being carried out by the U. S. Bureau of Reclamation, is a far-reaching water conservation project that will bring much needed relief to the Sacramento and San Joaquin valleys of northern California, where water tables have fallen year by year.

Although intended primarily for irrigation and flood control, Central Valley, like several other similar large federal projects in the West, has incorporated with it an ambitious power development program. This again brings up the disposition of federal power in connection with these essentially irrigation and flood control undertakings.

Shasta power house and the Keswick plant, a few miles below, will contain 450,000 kw. in electric generating capacity with an annual output of 1.5 billion kilowatt-hours as soon as equipment becomes available and the plants are fully completed. Although Shasta power for the present will be sold under contract to the private utility now serving northern California, the Department of Interior has actively planned and attempted to finance a 150,000-kw. steam plant to firm-up Shasta power and an extensive transmission system that would firmly place the federal government in the power business in another section of the West.

Since *all* of the people of *all* of northern California are entitled to share in the economic advantages that will accrue from this immense development, how better can the benefits of this new power supply be carried to them than to utilize the transmission and distribution facilities of all those agencies which now serve *all* the territory? Why should not this federally subsidized Central Valley power be distributed through existing public and private agencies to dilute power costs in the *entire* area, and utilize the revenue to give agriculturists *cheap water*, the primary justification for the project in the first place?

Why load up a thus far soundly conceived water development program with an additional investment of twenty-five or thirty million dollars for a steam plant and transmission, when there is already in operation an extensive interconnected transmission system, or power pool, of all the power agencies of California, with a great diversity of hydro and around a million kilowatts in steam, that is quite adequate to firm-up and distribute all of Central Valley's power, and more besides? Why spend millions of dollars more of taxpayer's money again to put the federal government in the power business when the territory is already adequately supplied with electric service at rates well below the national average?

Some one ought to answer these questions.

Lifetime Wiring

ONE of the sad detriments of the electrical industry's home wiring program has been the lack of a good slogan. Back in the early days here in the West a home with a modern and up-to-date wiring installation bore the "Check Seal" symbol, which was popularized by one distributor. Then for a long time the industry promoted "Red Seal" wired homes as being the latest thing. Finally national promotion settled on "Adequate Wiring" as the *ne plus ultra*. For ten years now the public has been urged to see that new homes had adequate wiring. Adequate for whom and for what? Adequacy for one family might be something else entirely for another. Adequate for all reasonable electrical requirements, the industry has attempted to infer. Maybe so, but one of the editors came up with a new designation the other day which seems to have everything a good slogan needs. He pro-

posed that the acme of good wiring be designated "Lifetime Wiring." The term has its points. It will register well with the public (we have tried it). It means something tangible—wiring that will serve for the life of the house. It is catchy. It is descriptive. So in the future why not "Lifetime Wiring"?

Postwar Electrical Jobs

PEACETIME jobs for the men and women in the armed forces and those in war goods industries are the key to American postwar economic prosperity. It is refreshing and comforting to know that the electrical industry appreciates its obligations and responsibilities in this respect and that it is ready to do its share. Elsewhere in this issue are the results of a survey conducted by the planning committee of the Pacific Coast Electrical Association. The survey shows that, for the area studied (and this might be considered typical for the whole nation), the electrical industry can take back all of its armed service people and have a 16% margin of employment opportunities for people now engaged in purely war work.

Naturally these are estimates based on potential business opportunities. They are definitely tied to such foreseeable postwar requirements as thousands of new homes, public construction programs, millions of new automobiles, refrigerators, radios and other home furnishings, arrears on all kinds of maintenance—industrial and commercial, deficiencies in farm equipment and normal expansion of many war-contracted services. Also they take into consideration new and almost new industries stemming from war-developed products.

Anything which would impair or remove the demand for any or all of these goods or services would throw the estimate of postwar employment opportunities in the electrical industry completely out of gear. Wrecked, too, would be the potential employment in most other businesses and industries. Unfortunately certain forces which could nullify all future plans for such postwar employment are in evidence. They include labor's insistence upon the highest possible employer-guaranteed wage (backed by government edict if possible) and the farmer's equally insistent demand for government-subsidized and guaranteed prices. Another such force is the continued threat of strangling government regulation and stifling taxation.

Reconciliation of all of these hostile forces and attitudes is essential if the promise of maximum postwar employment is to be fulfilled. Thus far there have been no suggestions nor any plans for harmonizing the conflicting viewpoints of government and business, labor and industry, and agriculture and business. They must be harmonized or there may be no jobs.

Dreams Into Nightmares

PROBABLY it is the Buck Rogers and Superman influence, touched off by such fantastic war tools as radar and now the rocket bomb. Whatever else may contribute, the passion for postwar dreaming is running amok and the magazines are full of fantastic dream homes and dream gadgets of the future. Evidently no union card in Jules Verne Local No. 1 is necessary to work overtime at this pretty pastime.

Even our conservative English allies seem to be afflicted with it, for recent articles in our contemporary, the *Electrical Review*, of London, discuss a number of such ideas. For instance: "The development of comprehensive kitchen units also raises the question of whether there might not be use for a combined cooker (range) and water heater unit, perhaps a version of the thermal storage cooker, the residual heat of the cooker being employed for heating the water. It has also been suggested that a single motor installed in the unit might, by means of a series of gears, serve not only for the refrigerator, but also for intermittent duty for the washing machine, mixer and built-in vacuum cleaner plant."

The difficulty with such dream stuff is that it may easily delay the reestablishment of business and employment after the war by causing so many of the prospects for replacement of wornout equipment to wait for some of these dreams to appear. Also it is likely to make the public suckers for all kinds of fantastic gadgets which promise dream fulfillment but have not been tested and really made to work satisfactorily. After the last war there was a plague of washing machines of that type which quickly became orphans and left the public with no one to make them work even half satisfactorily. An "orphan" appliance is a pain in the neck to the industry and customer.

Every manufacturer says that the first models turned out after reconversion must be the same as those of 1941 or 1942 with which manufacture stopped. If this stock lies around dealers' stores unbought because customers are waiting for the superdream models they have been led to expect, the economy of readjustment to peace may take a nose dive.

Floating on a cloud and expecting an all-gas house to serve breakfast in bed in some magic way is expecting a lot from gas. It is more like the kind of dream a person has when taking gas for a tooth extraction. But, on coming to, what a pain the reality is! The electrical industry will do well not to build the public up for such a cruel letdown. The plain facts about electrical convenience are worthwhile enough to come back to after the war.

License Contractors

B. C. association seeks full industry support

Progress toward securing provincial legislation to license electrical contractors and dealers in British Columbia is being made, Earl Dunsmuir told members of the Vancouver Electrical Assn., the contractor organization, at its twelfth annual dinner in Vancouver, B.C., recently. The entire industry in the future will be canvassed in support of the legislation.

Charles Longley, president of the association, announcing that all officers of the organization had been returned to office for another year, presided over the meeting.

The provincial legislation would call for registration of all electrical appliance dealers at a nominal fee. This would enable the electrical inspection department to control the sale of unsafe materials and appliances.

Two types of contractor's licenses are contemplated, an A license unlimited, a B license permitting nominal construction and repair work. Contractors doing heavy work would have the A license and be required to post a $1,000 bond. The B class would post a $500 bond. Firms in operation for over two years would automatically be granted the first licenses.

New contracting firms would be required to appear before an annual board consisting of the provincial electrical inspector, two representatives of contractors and two journeymen electricians representing the unions.

Other speakers at the dinner were President Longley; L. Taylor, B.C. provincial electrical inspector; Douglas Robertson, general manager of the Canadian General Electric Co. in B.C.; W. C. Mainwaring, general sales manager, B. C. Electric Railway Co. Robertson spoke on the postwar market for electrical construction, pointing out that the electrical industry will compete with the automobile, recreation, home furnishing and even liquor and tobacco industries. If all branches of the industry work toward providing more electrical goods to more people at less cost, he said, they can meet this competition and provide the user with better service for his money.

Mainwaring pledged the full cooperation of the utility. He discussed the history of the VEA, which combined two rival contracting organizations and told of the improvement since consolidation and cooperation. He also talked of the necessity to reabsorb the war-trained electricians who will return from the services in the future.

MODESTO BURNS

When Hotel Modesto burned down recently, all plans for the annual meeting of the Southwestern Section, International Association of Electrical Inspectors, which was to have been held there, were held up until another place for the meeting could be found. In these days of crowded hotels that was difficult, but Harold L. Gerber, secretary-treasurer has announced that full arrangements have been made to hold the meeting at Santa Cruz, at the Palomar Hotel, on the same dates, Aug. 28-30. The program this year, it is also announced, will have almost no addresses but be devoted almost entirely to the proposed revisions of the National Electrical Code in order that a 1945 edition can be brought out embracing experience with war substitute wiring materials and methods. Because of the new Code, this will be more important a meeting than usual and, because of shortage of accommodations, it was recommended that all who plan to attend make reservations at either Palomar Hotel or St. George Hotel, Santa Cruz, immediately, sending a deposit with the request. Railroad reservations, too, should be initiated at least 30 days in advance and the essentiality of the Code to public safety and health presented to the railroads as reason for the travel.

Aircraft at EMEA

New Applications of Electricity in Aircraft Production was the subject under discussion at the monthly dinner of the Electrical Maintenance Engineers of Southern California at Los Angeles, June 21. Mabel M. Rockwell, group research engineer, Lockheed Aircraft Corp., gave a short introductory talk and turned the meeting over to her co-workers, Henry Kramer and Robert Milmoe. Kramer discussed the applications and the equipment necessary for the flash-welding and Milmore talked about the brazing of odd shaped aircraft parts and the use of high frequency for the heat treating of steels.

Wm. H. Carter, vice-president and program chairman of the EMEA, recently resigned on account of ill health, a resignation that was accepted regretfully by the members and executive committee. Clarence R. Miller, Western Precipitation Co., was voted to the vacancy by the executive committee. With an extensive engineering background, Miller is thought to be an ideal choice for the guidance of the program committee.—Henry Bush, editorial committee chairman.

L. A. Electric Club

Roy Martindale, Bureau of Power & Light, last month was named president of the Los Angeles Electric Club. Elected to serve with him were: R. C. McFadden, first vice-president; Dean T. Smith, second vice-president; Roy N. Phelan, third vice-president; W. L. Stickel, secretary-treasurer; George Best, sergeant-at-arms; John Fox, Ray Gheen, Edward F. Gould, Sam W. Scott, Walter L. Willson, executive committee.

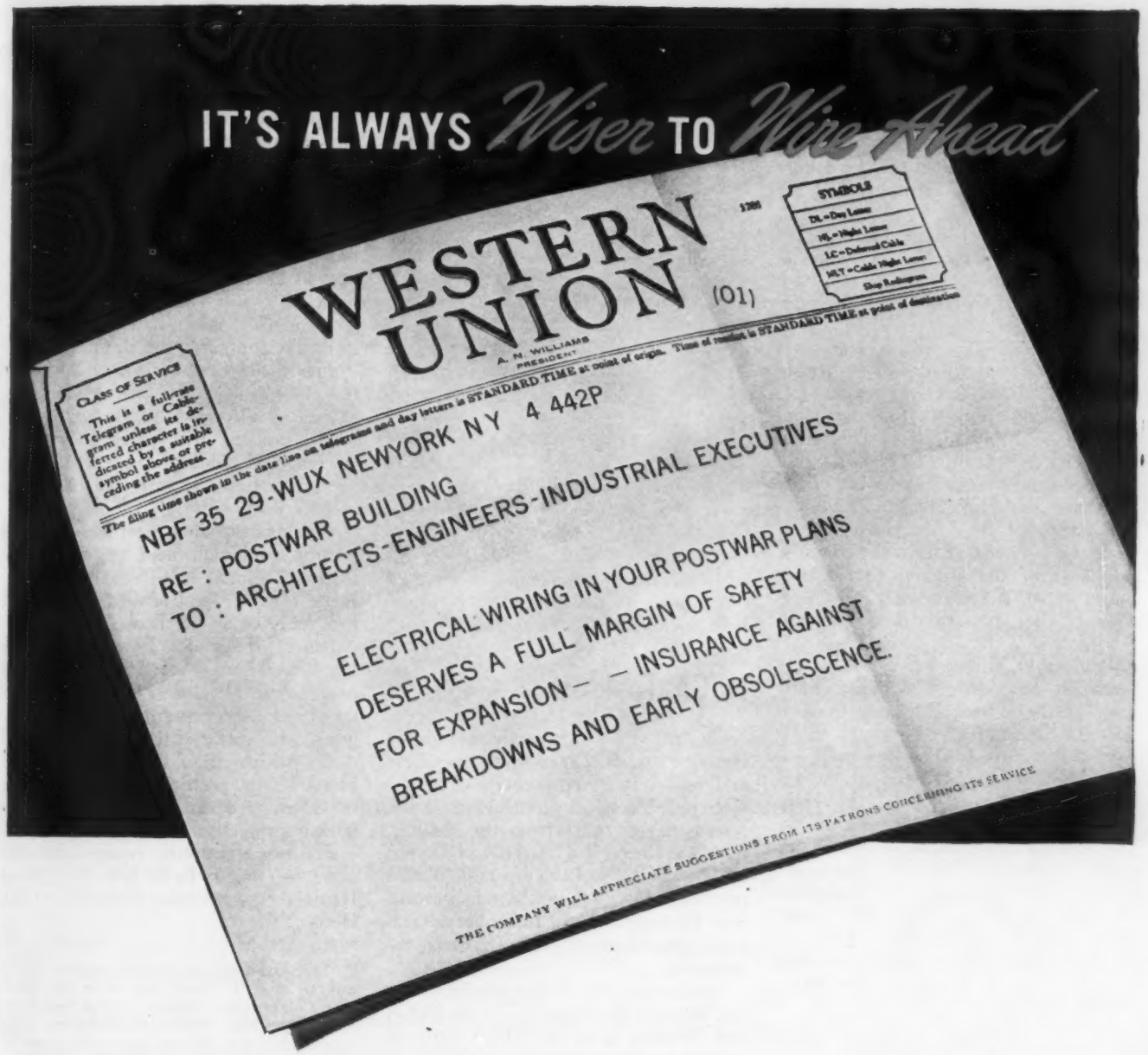
A recent speaker before the club was Dr. J. O. Perrine, New York, assistant vice-president, American Telephone and Telegraph Co., who told of recent accomplishments in communications techniques and probable improvements postwar.

● GEORGE C. TENNEY, vice-president McGraw Hill Co. of California, took office June 1 as chairman of the San Francisco Section AIEE. At the same time, D. I. Anzini, sales engineer, General Electric Co., became vice-chairman and Abe Tilles, University of California electrical engineering department, secretary-treasurer for the coming year.

● SEATTLE SECTION, IAEE, has named Charles H. Cutter, Pacific Electric Mfg. Corp., as its chairman for the coming year. Earl Hansen, Pacific Telephone & Telegraph Co., will be vice-chairman and Harold R. Brown, Boeing Aircraft, secretary-treasurer.

Sunk at Pearl Harbor was the battleship *Oklahoma*. How electricity helped to raise the battleship so that it could be taken to dry-dock and repaired was told by Charles Stockley, industrial engineering specialist, General Electric Co., who worked out much of the motor and control applications to make it possible, at the June 29 meeting of the Electrical Maintenance Engineers' Assn. of Northern California, PG and E Building, Sutter St., San Francisco. John Hayes, American Can Co., vice-president, recently elected, presided in the absence of J. E. Stewart, City of Oakland, president, who has been ill. Ross Manseau, Bethlehem Steel, was elected secretary-treasurer at the recent annual election, succeeding John Hayes.

Great Central Valley Chapter, IAEI met in Sacramento, Calif. on June 6.


IT'S ALWAYS Wiser TO Wire Ahead
WESTERN UNION
(01)
SYMBOLS
DL = Day Letter
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram
A. N. WILLIAMS PRESIDENT
CLASS OF SERVICE
This is a full-rate Telegram or Cable-gram unless its deferred character is indicated by a suitable symbol above or preceding the address.
The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination
NBF 35 29-WUX NEWYORK NY 4 442P
RE : POSTWAR BUILDING
TO : ARCHITECTS-ENGINEERS-INDUSTRIAL EXECUTIVES
ELECTRICAL WIRING IN YOUR POSTWAR PLANS
DESERVES A FULL MARGIN OF SAFETY
FOR EXPANSION— —INSURANCE AGAINST
BREAKDOWNS AND EARLY OBSOLESCENCE.
THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

PLANNING POSTWAR HOMES? A new factory? A brighter, more bustling town? You'll want to take every advantage of the wonderful electrical devices of tomorrow.

So—Wire ahead! Make sure that your electrical system can handle the greatly increased load that it will surely be asked to carry.

While you're in the advanced planning stage consult with your engineer, electrical contractor and utility power engineer. Unwired planning will cost you a lot more than planned wiring. 44243

HELP BRING VICTORY SOONER . . . BUY MORE WAR BONDS

ADEQUATE WIRING KEY TO VICTORY JOBS SERVES AND SAVES

ANACONDA

ANACONDA WIRE & CABLE COMPANY

25 Broadway, New York 4 . . . Sales Offices Principal Cities

Electrical Wires and Cables of Copper are the Life Lines of our Nation

Honorary

Francis H. Murphy, consulting engineer, Portland General Electric Co., was honored by the Portland Electric Club, at a special luncheon, May 25, where he was presented the third honorary membership ever granted by the club.

The citation called attention to his outstanding services to the electrical industry and the community, through his work with the Illuminating Engineering Society beginning in 1906; the AIEE in 1907; the Electric Code Committee for the first Portland electric code, 1912; the Oregon Technical Council, 1920; Oregon Building Congress, 1920; Portland Apprenticeship Council, 1929; and as one of the founders and the first president of the Electric Club of Portland, 1929.

Walter W. R. May, formerly of Portland General Electric Co., now publisher of the Oregon City *Enterprise*, acted as toastmaster and presented the honorary membership plaque.

Principal address of the day was made by Franklin T. Griffith, chairman of the board, Portland General Electric Co., and first honorary member of the club. L. T. Merwin, president, Northwestern Electric Co., second honorary member of the club, spoke briefly as did Mrs. Dorothy McCullough Lee, commissioner of public utilities, City of Portland; Frank L. Shull, county commissioner, Multnomah County; L. W. Going, chief electrical inspector, City of Portland; and H. J. Lake, business manager and financial secretary, IBEW, No. 48.

North On No. 14

Safeguards necessary to the installation of high-voltage tubular lighting on the interior of a building and Code regulations differentiating between sign and outside installations and interior jobs, made up the inspector problem discussion session at the second quarterly meeting of the Northern California Chapter, International Association of Electrical Inspectors, at Pacific Gas and Electric Co. auditorium, San Francisco, May 24, presided over by Harry Romick, San Francisco, chairman.

The resolution respecting eliminating No. 14 wire in residential wiring, proposed by Pacific Coast Electrical Assn., was also discussed extensively without reaching any conclusion. Opinion was divided over the issue of fusing lighting circuits at 20 amp., the elimination of No. 14 having already become an accomplished fact for all convenience outlet circuits in most of the cities. Another meeting is to be held at the same place in July.

MAY MURPHY

NECA To Elect

To introduce the newly appointed manager, A. R. Linn, to its members and to select a representative on the National Electrical Contractors Assn. board of governors from the chapter, the Northern California Chapter, NECA, is to hold a special dinner meeting, July 14, at Hotel Stewart, San Francisco, T. L. Rosenberg, Oakland, president of the chapter, announced.

Nomination for a vice-president for the Western division, No. 6, of NECA and decision as to the NECA national advertising program are also to be discussed. The services now offered by the association to its members with the appointment of a manager, will likewise be outlined in detail.

Future of residential lighting and some postwar implications were told to the Los Angeles Section IES at its June meeting. Frank Wagner, Wagner-Woodruff Co., chairman of the committee on residential lighting, submitted a report on a recent study by his committee of the entire scope of domestic lighting applications, trends and future development. With an eye to sorting the impractical and imaginative from predictions of things to come, the committee presented some concrete suggestions in the form of drawings on fixture design, layout and lighting result, utilizing fluorescent and incandescent lamp sources.

R. A. Johnson, Los Angeles district manager, General Electric aviation section, spoke before the San Francisco Electric Club in June.

Sam Hibben, Westinghouse, was the guest speaker at last month's Rocky Mountain IES meeting.

South On Problems

Each year the Southern California Chapter, IAEI, meets for its May meeting in Long Beach. This year it had the pleasure of a glimpse of Otis Newcomb, Long Beach city electrical inspector, host to all past years' meetings but recently very ill. The May 24 meeting was presided over by I. E. Bartlett, Inglewood inspector, chairman of the chapter.

Inspectors problems discussions swept a wide range, including gas tube signs revived since the dimout, trailer camps with cord wiring, a $400.000 fire in an airplane spray building caused by a workman opening an outlet to tap the live wires to run an electric drill, adding a range to a service where lighting only had been previously provided.

Speakers at the meeting included Arthur Schanuel, field representative for the National Adequate Wiring Bureau; Mrs. M. M. Gaffney, home service representative, Los Angeles Department of Water & Power, who gave her *Better Care—Less Repair* talk and demonstration; and J. G. Moyen, electrical engineer, Square D Co., Los Angeles, who spoke of trends in electrical usage which should require changes in standards, such as the wiring space in 30-amp. enclosed switches, range wiring protection in the range itself, and service entrance equipment. Another meeting is to be held July 26 at Huntington Park Women's Club House.

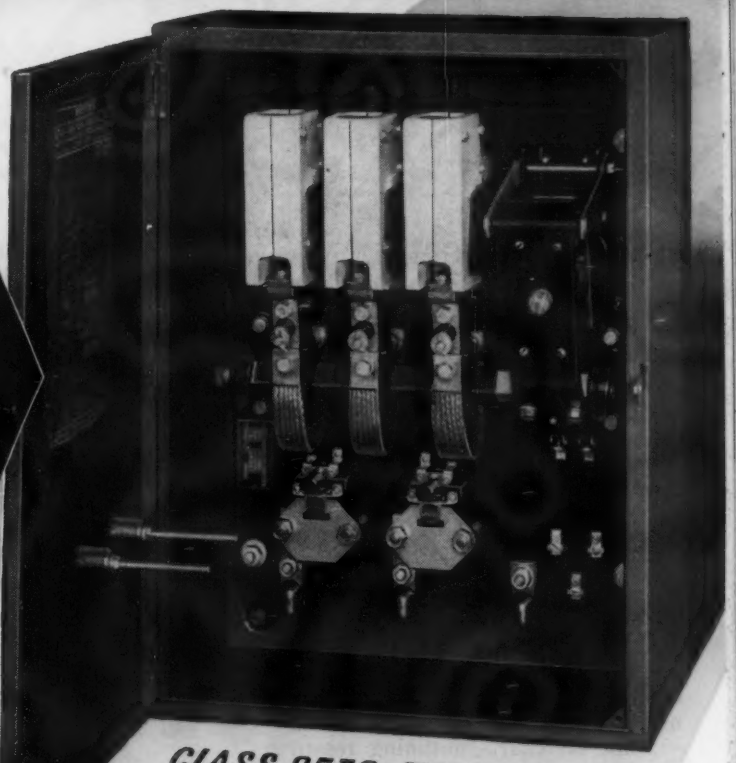
Ships and Lighting was the subject of the talk by Wm. P. Bear, now with the Maritime Commission, Oakland, at the San Francisco Bay Cities Section, Illuminating Engineering Society, Monday evening, June 12, at the Engineers' Club. Bear described the typical lighting and wiring installation on the freighters being manufactured under the supervision of the Maritime Commission and urged improvement in the lighting standards on board ship. He urged that the IES work on this problem to bring ship lighting standards somewhat in line with ordinary shore practice. The problems of protection from shock, corrosion, weather, and moisture were taken into account. Robert L. Dearborn, Kaiser Co., Oakland, presided in the absence of Romaine W. Myers, chairman.

Electrical Postwar Planning in the Pacific Northwest was the subject of a talk by Lars Carlson, regional manager, Pacific Northwest Committee for Economic Development, before the Electric Club of Washington in June.

Dr. David A. Chambers, who has combined the functions of optometry and illuminating engineering into a new professional status, "seeing specialist," spoke before the Oregon IES on June 27.

Postwar Wiring was the subject and Arthur Schanuel, the speaker, at a recent meeting of the Electrical League of Utah in Salt Lake City.

AN *Improved* SIZE 4 STARTER WITH FIVE NEW FEATURES



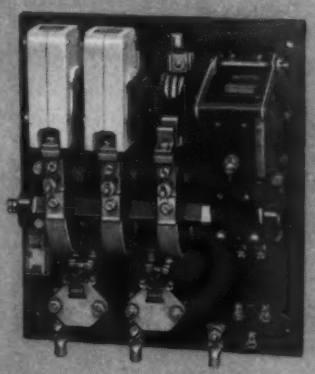
CLASS 8536 · TYPE VG-2

----SMALLER-QUIETER----

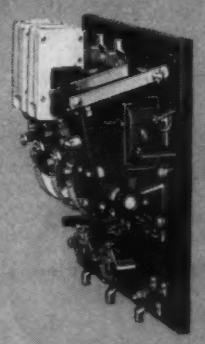
1. Improved blow-out coils have fewer turns and are wound with heavier copper—assuring less heating effect, and efficient interruption of stalled rotor currents for electric motors up to 100 horsepower.
2. New and larger magnet of modified **"E"** type construction gives added efficiency.
3. Self-aligning, floating armature eliminates vibration noise—reduces heating and magnet wear.
4. New shading coil affords exceptional mechanical strength. This coil is held in place by the magnet coil in such a manner as to prevent its falling out. Use of heavy brass ribbon makes shading coil virtually unbreakable.
5. Narrower panel saves space and flat door cabinet permits gang mounting.

• • •

This greatly improved Type V device is available in a complete range of enclosures for all Size 4 starter applications, including reversing, combination, multi-speed, reduced voltage, etc. Contact your nearest Square D Field Engineer or Square D Electrical Distributor.



Open type starter panel with one arc chute removed to reveal contacts and blowout coil.



Side view of panel shows "E" type magnet, floating armature and new shading coil.

SQUARE D COMPANY

LOS ANGELES • DETROIT • MILWAUKEE

NEWS of the industry

BONNEVILLE REPORTS ON NORTHWEST OPPORTUNITIES

Postwar coordination of Northwest power development with fuller utilization of the region's natural resources is outlined in a report entitled *Pacific Northwest Opportunities* just issued by the Bonneville Power Administration. The 104-page study, according to BPA Administrator Paul Raver, sets up the "potentialities of greater consumption of power . . . to assist power distributors, public and private, in meeting the challenge of full electrification of the region's homes, farms, commercial and industrial establishments."

Some 85 charts outlining resource development potentials of the area have been worked up under the direction of Ivan Bloch, chief of the BPA division of industrial resources and development. Purpose is to point up marketing opportunities for electrical power which will enable BPA to dispose of a probable 500,000 kw. or more of energy now going to wartime electro-metallurgical and chemical plants. This power will likely be in the surplus category when peace comes.

In addition, the study envisions the day when industrial development might exhaust present power supplies and it outlines five new power projects to develop an additional 1,530,000 kw. of federal power. The proposed dams are as follows: Umatilla Rapids on the Columbia River, 600,000 kw. costing $91,000,000; Foster Creek on the Columbia in Washington, 600,000 kw., $56,000,000; Hungry Horse on the Flathead River in Montana, 140,000 kw., $32,000,000; Cabinet Gorge on the Clark Fork of the Columbia River in Idaho, 100,000 kw., $11,000,000; and The Detroit Dam on the Santiam River in Oregon, 90,000 kw., $29,000,000.

Individual studies are presented on various natural resource developments. Included in these are the following:

Crop land opportunities in addition to the present developed acreage are estimated at 3½ million acres, which would involve electric pumping totaling 1,200,000 kw. and 4 billion kwh. annually.

Industrial development possibilities include forest products and basic metallic and chemical industries. Rated most important of these is the fertilizer industry because of the huge deposits of phosphate rock. Many under-developed manufacturing industries are listed.

A potential residential consumption averaging 4,000 kwh. annually is envisioned. Upwards of 34,000 farms also might be electrified, according to the report. As many as 180,000 electric house heating installations are predicted.

Main line railroad electrification is listed as a possibility, with the assertion that the present 730 route miles of electrified line might be increased by 2,860 miles.

Several maps are included showing location of present and proposed power developments and transmission lines.

Utah Approves Water Treaty With Mexico

Approval of a pending treaty which would allocate to Mexico waters of the Colorado, Rio Grande and Tiajuana rivers was voiced by Utah when representatives of irrigation water users met in Salt Lake City recently and affirmed ratification of the pact.

Lined up with Utah are Colorado and Arizona, while California and Nevada are raising strong objections to the treaty.

Water users' vote was transmitted to Utah's members of the Western states advisory committee to the state department.

CITY STILL SEEKING WAY OUT ON HETCH HETCHY

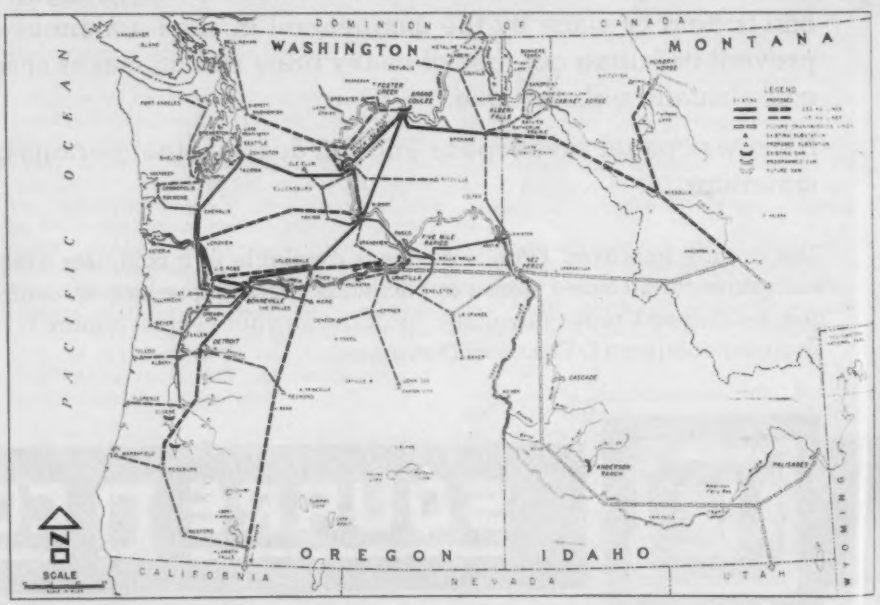
Bringing to the fore again the tangle surrounding distribution of Hetch Hetchy power, San Francisco last month sought further delay of the Federal Court injunction forbidding sale of the energy to a private corporation for resale. In granting a 60-day stay to Aug. 31, Judge Michael J. Roche warned that "these year-to-year extensions cannot go on indefinitely."

Temporary solution to the problem is provided in sale of the power to a Defense Plant Corp. aluminum plant at Riverbank. The contract contains a cancellation clause, however, and, in the event the plant were shut down, the city would face a revenue loss of $2,400,000.

City officials revealed they were considering use of the power to operate San Francisco's combined street railway systems. This and other city demands would consume 50 to 60% of Hetch Hetchy's capacity, it was estimated. Any such plan, however, would require construction of a transmission line from Newark into the city or lease of Pacific Gas and Electric Co. facilities.

Original contract for purchase of the output of the $100,000,000 system by PG and E was declared a violation of the Raker Act. Federal Court decision was upheld by the U. S. Supreme Court.

Diagramatic map showing present and proposed power development in the Pacific Northwest, one of several in Bonneville's study of resources



MORE *Work* LESS *Manpower* ... DEMANDS MORE *Truck-Power!*

This is it: FWD means more truck-power . . . the answer to the utility problem of increased service from decreased manpower.

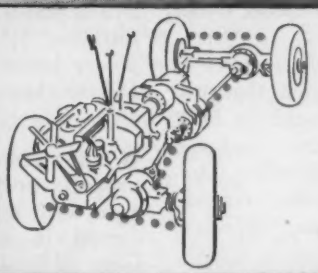
FWDs are engineered for public utility service . . . special power take-offs for winch and boring work are part of the basic design . . . pole derrick, splicer's cart, cable-laying, plows and other practical line-construction and maintenance accessories increase the usefulness of these trucks.

On or off the highway, in any weather, over any terrain, FWDs go in with drive in all four wheels to do whatever the emergency calls for . . . making up for much of the manpower shortage with greater truck efficiency. They are first choice of more than 150 utility companies operating big fleets.

THE FOUR WHEEL DRIVE AUTO COMPANY, Clintonville, Wisconsin
Canadian Factory: KITCHENER, ONT.

The Oldest and Original Exclusive Builders of Four-Wheel-Drive Trucks

FWD TRUCKS



Four-Wheel-Drive... THE BACKBONE OF RUGGED, DEPENDABLE TRUCK HAULING POWER

The true application of four-wheel-drive with center differential provides ability to get through under difficult conditions — increased surety and safety on the road — lower operating cost per ton-mile — long service life.

BUY MORE WAR BONDS

IN EVERY FIELD WHERE TRUCK QUALITY IS PUT TO THE TEST, FWD'S STAND UP

COMMERCIAL

CONSTRUCTION

UTILITIES

OIL-FIELDS

MILITARY

NOTHING Will SHAKE Them LOOSE!

SHELDON EV-R-ON

SOLDERLESS CABLE TERMINALS

A MUST for Utilities and Industrials
Dependable, Secure, Efficient Anchoring

EV-R-ON Lugs are vibration-proof. They CANNOT shake loose. These solderless terminals anchor conductors dependably, securely, efficiently, permanently.

Terrific gripping pressure is exerted in them by their pressure-bars upon the cables, so as to actually compress the latter. This is the result, at no extra cost, of more precise machining, the use of more costly alloys and of Class 2 threads, which it is practically impossible to strip. They are heavy-duty connectors in every respect.

Then, too, a far fewer number of sizes accommodates every conductor size from No. 8 Solid to 1000 MCM.

Send for Full Information.

TRIANGLE PACIFIC CO.

R. E. LARSEN, 1045 Bryant St., San Francisco 3
C. H. KAUFMAN, 340 Azusa St., Los Angeles 12
R. S. SLOAN, 95 Connecticut St., Seattle 4

"You're Well Connected with SHELDON"

NORTHWEST ALLOTTED 39 USBR PROJECTS

An additional 1,687,000 kw. of power for the Northwest is provided in the Bureau of Reclamation's public works program presented last month to the Senate committee on postwar economic planning and policy. The entire program contemplates construction of more than 236 irrigation and multiple-purpose projects in 17 Western states and expenditure of approximately 3 million dollars.

Discussing the proposal, Frank A. Banks, regional director of reclamation at Coulee Dam, said that if the program is approved it will mean employment and settlement on irrigated land of thousands of servicemen and demobilized industrial workers. It is estimated that at least 1,251,000 men would be required to build the projects and provide the construction materials and supplies.

Banks stressed, however, that construction of the projects could be undertaken only with the approval of people of the area affected, because many of the developments would require special legislative consideration.

The inventory lists 20 projects, costing $169,000,000, for Idaho. According to bureau figures, these proposed developments, if completed, would increase power installations on authorized projects in that area by 70,000 kw., and on projects under study by 150,000 kw.

Four projects in the state of Washington are named in the list, the largest being the 1,000,000-acre Columbia Basin development. Proposed construction would increase power installations on authorized projects by 852,000 kw., and provide 622,000 kw. of firm power on projects being investigated. Cost of the program in Washington would total $369,900,000.

Oregon's proposed 15 projects, which would cost $59,681,000 to construct, would make available 8,500 kw. of new firm power on projects under study.

Rivers running through sections of the Northwest along which the proposed power projects would be built include the Boise, Payette, Spokane, Snake, Salmon, Pend Oreille, Deschutes, Malheur, Molalla, Grande Ronde, Crooked, Rogue, Powder, Yamhill and Illinois.

● CONGRESS last month approved a $3,813,540 operations and maintenance budget for the Bonneville Power Administration. Included in the appropriation was $127,000 to be spent on industrial research and market development projects.

Also approved was the sum of $6,935,000 for construction of transmission lines, of which $485,000 was specifically designated for the construction of a 115,000-volt line from Grand Coulee Dam to Brewster, Wash.

Move Made To Allow Ickes To Market Surplus Power

Interior Secretary Harold Ickes would be granted authority to market surplus power generated at all power plants provided in the Rivers and Harbors bill now before Congress, in an amendment sent to the Senate by its commerce committee.

The committee also amended the Snake River project to include all ten proposed dams rather than just four. At least three power plants, with a total capacity of 155,000 kw., are included in the project.

It is believed that the committee would amend the flood control bill to include the Ickes power marketing amendment. Such action was suggested by War Secretary Henry L. Stimson after he received a letter from President Roosevelt saying in part: "I also want the power generated at projects built by the Army Engineers to be disposed of by the Secretary of the Interior."

Hungry Horse Construction Awaits Material, Manpower

Construction of the Hungry Horse Dam on the south fork of the Flathead River in Montana when materials and manpower become available was provided in a bill signed last month by President Roosevelt. The bill is an authorization only, without appropriation.

First step in the project will impound 1,000,000 acre-feet of water for upstream storage for Columbia River hydro plants. Ultimately, the dam will impound 1,500,000 acre-feet and the power house will have a capacity of 150,000 kw.

● SOUTHERN CALIFORNIA EDISON CO. property in Bellflower, Calif. was damaged last month, when a break occurred in a line carrying gasoline from oil fields to a refinery. Three persons were killed and four homes destroyed in the resulting explosion and fire. Edison damage included three wood poles, a 10-kw. transformer, secondary and primary line.

TWO SUGGESTIONS FOR FAST, LOW-COST RECONVERSION

USE THIS BOOK . . .

to save time in selection . . .
ordering . . . application

The Westinghouse Distribution Apparatus Digest is distributed at regular intervals by Westinghouse distributors. It includes complete specification and application data on porcelain insulators, lightning arresters, cutouts, power fuses, transformers, capacitors, voltage regulators, meters, instruments, circuit breakers and lighting.

Ask your Westinghouse distributor for a copy . . . he'll be glad to supply you and put you on his mailing list for future issues. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

Your Westinghouse distributor offers two important aids in meeting sudden load shifts on war-loaded power lines.

First: Westinghouse "one-package" CSP Distribution Transformers . . . easily movable as a unit when load centers shift.

Second: The distributor's own "how-to-do-it" ability . . . knowledge drawn from Westinghouse transformer headquarters and experience gained in similar applications for many other customers.

CSP transformers are completely self-protecting against lightning, short circuits and dangerous overloads. Every part is co-ordinated and built-in, making installation simple . . . relocation quick and easy, with just ONE unit to move instead of many pieces of conventional equipment.

Your Westinghouse distributor handles CSP distribution transformers in ratings up to 50 kv-a to meet any single-phase 60 cycle requirement. Call on him for prompt, competent help and recommendations.

J-90511

SEE YOUR WESTINGHOUSE DISTRIBUTOR *FIRST!*

Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

COLORADO-BIG THOMPSON TUNNEL NOW COMPLETE

Connecting eastern and western portals of the Colorado-Big Thompson water diversion project, holing through of the 13-mile Alva B. Adams tunnel was completed in June. Ultimately more than 300,000 acre-feet of water will be diverted annually from the headwaters of the Colorado River to the plains and valleys of the South Platte River drainage area in northern Colorado.

Power features of the development when completed will produce approximately 900,000,000 kwh. of energy, equivalent to the 1941 output of all Colorado generating plants. Two units of the power plant at the Green Mountain Dam on the Blue River were put into operation a year ago and have a capacity of 20,000 kw.

Oregon Alumina Refinery Gets Power Installation

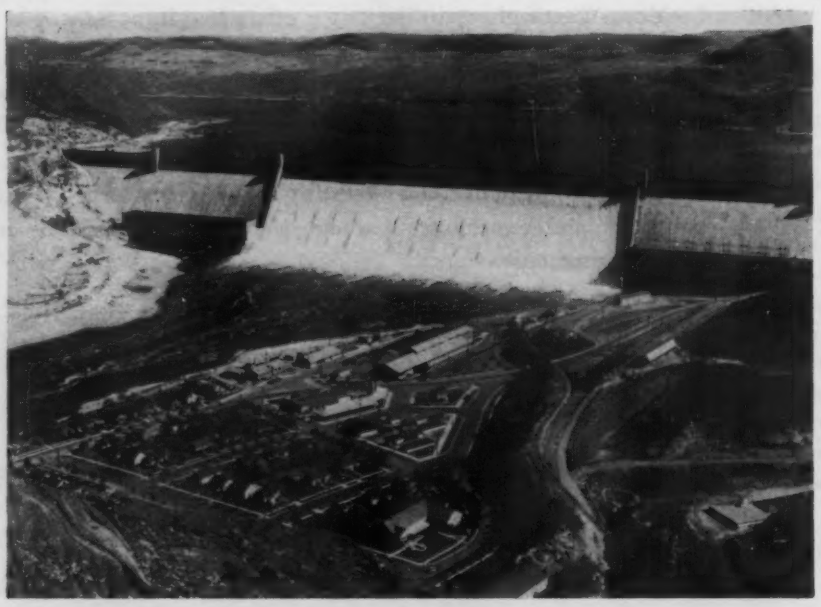
WPB and DFC approval has been secured for installation of electric steam boilers at the $4,000,000 alumina refinery near Salem, Ore., it was reported recently by Bonneville Power Administration. Next step is to secure authorization for a 37,500-kw. transformer bank. Forced air cooling equipment will increase transformer capacity to 50,000 kw., estimated boiler load.

With exception of the use of oil necessary for one step in the alumina reduction process, the new plant will be electrically operated.

In addition to the 50,000-kw. boiler load, the plant will require between 12,000 and 15,000 kw. for use in processing Northwest clays into alumina and for heating plant and office buildings.

S. E. Schultz, Bonneville's chief engineer, reported that Bonneville crews already have completed construction of three miles of 115,000-volt line and installation of a temporary 1,000-kva. transformer. Design work on the first 12,000-kva. bank of transformers is nearing completion and installation will be started as soon as materials are available.

● The Home Gas & Electric Co., distributors of electricity in Greeley, Colo. and several nearby towns and adjacent rural areas, was granted a 20-year extension of its present 25-year franchise which does not expire until 1949. Greeley's city council validated the new franchise when it appeared that a reorganization of the company is in process, and that financial arrangements are contingent on such extension of the concern's operating permit. Local interests recently purchased the entire common stock of the company, which had been held for several years by RFC.



This USBR photo shows the Columbia River flood waters flowing over the 1,650-ft. wide central spillway at Grand Coulee Dam. Another portion of the river is plunging into turbines installed in the west power house

USBR REPORTS INCREASED POWER PRODUCTION

Power production in the Reclamation Bureau's 30 plants was 11.9 billion kilowatt-hours in 1943 and has shown a substantial increase so far this year, Commissioner Harry W. Bashore reported on June 17, the forty-second anniversary of the passage of the Reclamation Law.

"The production of electrical energy has almost trebled since Pearl Harbor and 90% of the output is being used by wartime industries," Bashore said. "The installed capacity at all of the bureau's plants totaled over 2,000,000 kw. at the end of 1943. The addition of new generators at Grand Coulee in February and two new generators to be started at the Shasta power plant in California early in July will bring the grand total capacity on bureau projects to almost 2,500,000 kw."

Bids Called on Fort Peck Transmission Line

Bids for the construction of a 140-mile 115-kv. transmission line from Fort Peck power plant to Glendive, Mont. and a 20-mi. 34.5 kv. transmission line from Frazer to Wolf Point, Mont., were to be opened July 10, according to a USBR announcement.

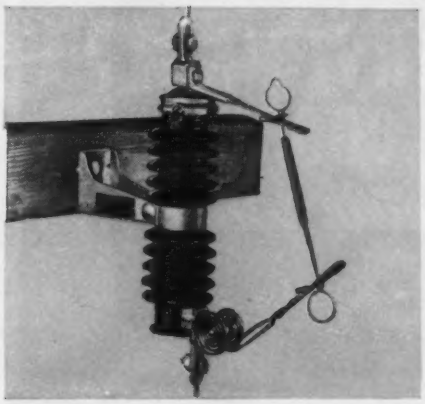
The 115-kv. line will be a three-phase, single circuit, 60-cycle, wood-pole, H-frame type and will connect the switching station at the Fort Peck power plant with the substation to be constructed in or near the town of Glendive. The 34.5-kv. line will be a three-phase, single-circuit, 60-cycle, wood-pole line and will extend from an existing line near Frazer to the substation of the Montana-Dakota Utilities Co. at Wolf Point.

Nisqually Engineer Tells Project Cost to Date

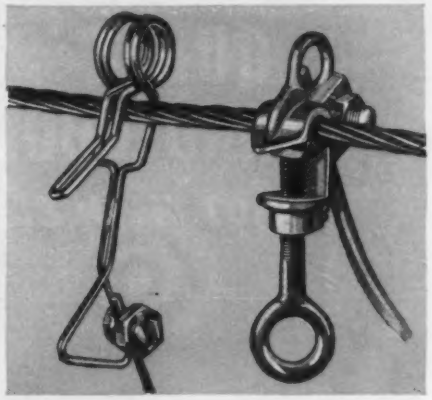
Expenditure of $525,976 during April boosted total costs to date of the second Nisqually power project to $17,712,381, it was disclosed in a report made recently to the Tacoma, Wash., city council by Chief Engineer J. J. Downey.

Work on the project was reported to be moving at a normal rate following removal of cavein in the LaGrande tunnel, leading from the dam to the power house. The cavein, which occurred in March, was responsible for a protracted delay in work on the underground incline.

FUSE LINKS—individually wrapped, then packaged again in packets of five, arrive at the pole just the way they leave the Kearney factory.



LOW MASS, extra-flexible switch parts mean high resistance to mechanical shock and heavy short-circuit rupturing capacity.



CLAMPS. There is a Kearney Con-nec-tap clamp for the most unusual load or construction problem. Made in many types for all wire sizes.

COMBAT LIGHTNING THE EASY WAY

Are you trying to combat lightning discharges the hard way? You are if you're using devices that attempt to choke surges by interposing a high resistance in the path to ground. This method has the effect of keeping a high percentage of the surge on your lines where it may spill over bushings, line insulators or break through transformer windings. In consequence these choked and reflected surges are the direct cause of the many outages from fuse link blowings if not more serious damage, after lightning storms.

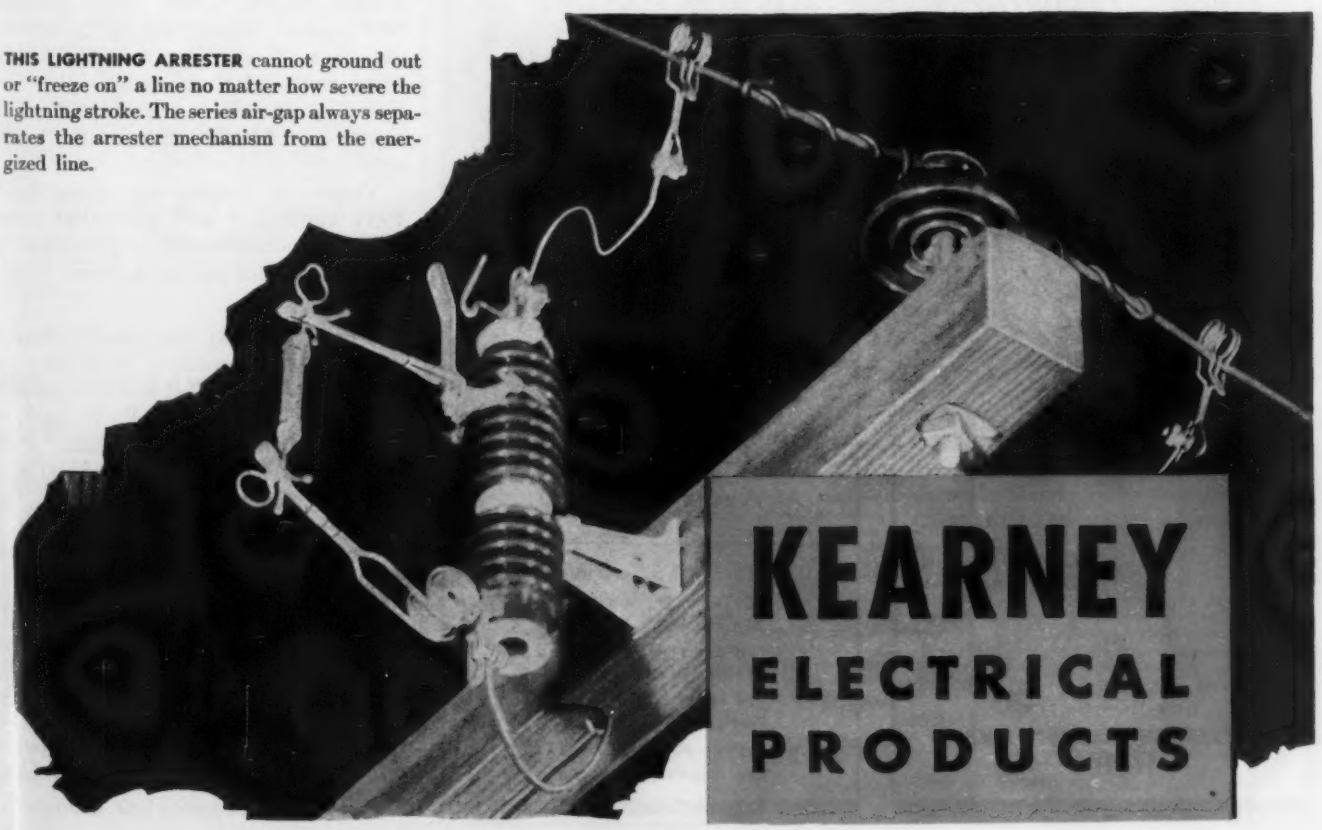
The easy way is to direct lightning surges to ground through a low resistance path so that all of the surge, electrical stress and reflected voltage is drained to ground within a fraction of a microsecond. Power follow-ups are snuffed out usually within the first current zero and your lines will operate through many lightning storms without even blowing a fuse link. This is what you may confidently expect when you change to Kearney Lightning Arresters. What's more you start off with the initial advantage of paying much less for the Kearney Arresters—and they will continue to pay dividends by reducing fuse-blowings, trouble-trips and lightning outages to a new low.

Please address your letter to Department "H".

JAMES R. KEARNEY CORPORATION
4236 Clayton Avenue, St. Louis 10, Missouri

PRACTICAL—SERVICEABLE—DEPENDABLE

THIS LIGHTNING ARRESTER cannot ground out or "freeze on" a line no matter how severe the lightning stroke. The series air-gap always separates the arrester mechanism from the energized line.



QUICK SERVICING AND GOOD COOKING
for any electric range

It's a CHROMALOX HEATFLO

Chromalox Super-Speed range units and parts available without priority—under WPB Order L-65.

replacement unit – the electrical dealer's answer to all range unit troubles.

EDWIN L. WIEGAND CO., 7540 Thomas Blvd., Pittsburgh 8, Pa.

MONTGOMERY BROTHERS: 61 Fremont St., San Francisco 5, Calif.; 911 Western Ave., Seattle 4, Wash.; 2333 N. W. Westover St., Portland 10, Ore.; 420 S. San Pedro St., Los Angeles 13, Calif.

THE PETERSON CO.: 1925 Blake St., Denver 2, Colo.

ECONOMICAL

Jeffries Transformers

Reasonable in Price
Reliable in Performance

Jeffries large transformers are priced reasonably—and you can save their first cost in a short time by minimizing current losses. When you use a Jeffries transformer, you can provide voltage change at the point desired, without prohibitive expense.

We supply all types and sizes. If not in stock, we build to order in a hurry—a week to 10 days.

Write today for catalog

JEFFRIES TRANSFORMER COMPANY

1710 E. 57th St. Los Angeles 11, Calif.

HELWIG COMPANY

•

Carbon Products

•

Multiflex Brushes
Give Better
Commutation,
Longer Life,
Less Commutator Wear,
That Extra Demand Required,
Better Performance
All Around

Pacific Coast Offices

70 Tenth St.,
San Francisco 1, Calif.

166 Jackson Street
Seattle, Washington

324 N. W. Broadway
Portland, Oregon

225 W. Pico Boulevard
Los Angeles, California

REDWOOD COOP ASKS COURT INTERVENTION IN SALE

Carrying to the state supreme court its fight to prevent purchase of the Charles L. East Electric Distribution System in Humboldt county, Calif., by Pacific Gas and Electric Co., the Redwood Electric Cooperative, Inc., recently asked a mandate to compel the California Railroad Commission to consider its own application for acquisition of the properties.

The cooperative asserts East had agreed to sell to it the 50 miles of lines in the Redwood Empire for $80,000 before making a later contract with PG and E. Petition of the coop stated it was organized to handle a $282,000 REA commitment for use in buying the East properties and extending and improving them to serve 325 families.

The railroad commission is able to consider sales only when application is made jointly by both buyer and seller.

Sacramento Case Recessed After Defense Testimony

Following completion of defense testimony in mid-June, trial of the condemnation brought by the Sacramento Municipal Utility District to acquire Sacramento properties of Pacific Gas and Electric Co. was recessed until September.

The district seeks to purchase the system, which covers approximately 640 square miles, for $11,632,000, valuation fixed by the California State Railroad Commission, plus net value of additions since 1938. The utility asks $18,302,081 for the property.

Voters of Sacramento County in 1934 authorized a $12,000,000 bond issue for construction or purchase of an electric distribution system.

● FPC Approval last month cleared the way for acquisition by California Electric Power Co. of electric properties owned by Leonard P. Wickoff in San Bernardino County, Calif. Purchase price is estimated at $100,000. When materials can be secured, the power company plans to construct a 60-mile line connecting the properties into its system. Upon interconnection, rate reductions will be put into effect, the announcement states.

● For Its 1943 Report to stockholders, Puget Sound Power & Light Co. recently was awarded the "Reddy Kilowatt" award of the Edison Electric Institute.

OREGON REA WOULD BUY CALIFORNIA PROPERTIES

Sale of the Crescent City, Calif., water and power properties of Public Utilities California Corp. to the Coos Electric Cooperative, a southern Oregon REA, for $245,000 was pending last month before the California Railroad Commission.

Meanwhile officials of Del Norte County, in which Crescent City is located, were informed by California's attorney general, Robert W. Kenny, that it would be legal for the town and surrounding territory to form a municipal PUD and, in case a special election was held, to include only part of the territorial confines of any one precinct in the proposed district. Earlier efforts to block the sale to the Oregon cooperative by purchase of the properties by a county-wide district were defeated by a narrow margin at an election last May.

Sale of Nevada Properties Goes Before Commission

California Railroad Commission approval is sought for sale of electric and water systems of Western States Utilities Co. at Winnemucca, Nev., to California-Pacific Utilities Co. of San Francisco. Purchase price is reportedly more than $500,000.

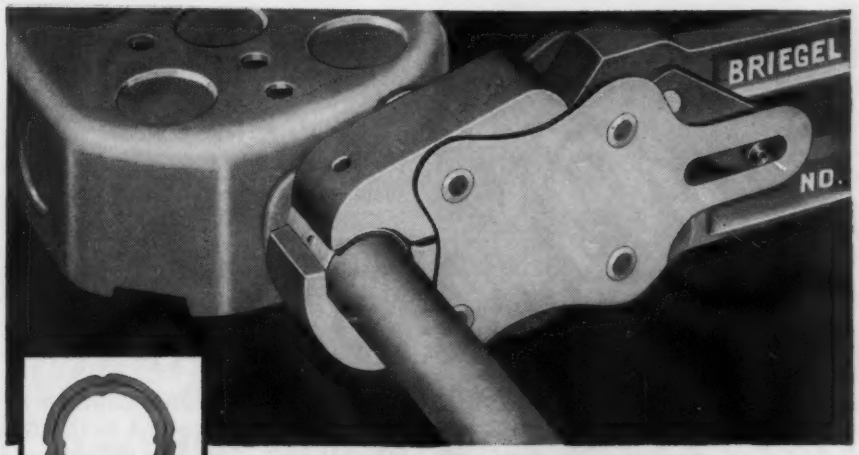
California-Pacific Utilities, which operates electric, water, gas and telephone systems in California, Oregon and Nevada, also is seeking purchase of Western Utilities properties in Malad City, Idaho, and Cokesville, Wyo.

If WPB authority is granted, California-Pacific will install two additional diesel generating units at Winnemucca.

Utah Power & Light May Sell Wyoming Holdings

Hearing by the Wyoming Public Service Commission of a joint petition for the sale of Utah Power & Light Co.'s electric power system at Green River, Wyo., to Southern Wyoming Utilities Co., is scheduled to open July 6 in Cheyenne. Southern Wyoming Utilities is a wholly-owned subsidiary of the Union Pacific Railroad.

In a joint petition filed June 27 by the two companies, consideration was listed at $250,000 plus inventory price of supplies and materials on hand.



Cross section Showing Indentations.

E·M·T·UP THE QUICK WAY
Two Squeezes and it's Set

TWO QUICK SQUEEZES give you Finer, Faster Conduit Connections. B-M Fittings do away with the twisting, turning and tightening of nuts and save you valuable time and materials. Then too, they are stronger, neater and much easier to work with in tight places. Start using B-M Fittings today. Have more satisfied customers—more profits from each job!

(All B-M Fittings carry the Underwriters Seal of Approval)

DISTRIBUTED BY

The M. B. Austin Co., Chicago, Ill.
Clayton Mark & Co., Evanston, Ill.
Clifton Conduit Co., Jersey Cy., N. J.
Gen. Electric Co., Bridgeport, Conn.
The Steelduct Co., Youngstown, Ohio
Enameled Metals, Pittsburgh, Penn.
National Enameling & Mfg. Co., Pittsburgh, Pa.
Triangle Conduit & Cable Co., New Brunswick, N. J.

Prompt Deliveries on Properly Rated Orders

BRIEGEL METHOD TOOL CO. • Galva, Ill.

What's New in
STAGE
SWITCHBOARDS

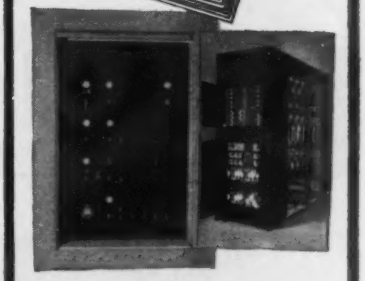
WRITE FOR YOUR COPY OF THIS NEW, INFORMATIVE BOOKLET

CUSTOM BUILT SWITCHBOARDS
•
STAGE and GENERAL LIGHTING EQUIPMENT

Today our shops are almost entirely occupied with war projects such as Marine Switchboards, Stage Switchboards and Lighting Equipment for Army, Navy and Air Corps installations. But where priorities permit and materials are available, we can still fill orders for industrial and other applications.

If we or our Resident Engineer nearest you can be of assistance, please call on us. And let us send you our new booklet which describes the latest developments in Stage Switchboard design.

HUB ELECTRIC CORPORATION
2219 West Grand Avenue • Chicago 12, Ill.



HUB-REGULITE stage switchboard at Norfolk Naval Hospital, Portsmouth, Va. Pilot control station and remote switchboard are illustrated.

Splice it with
Fargo
"the sure splice"

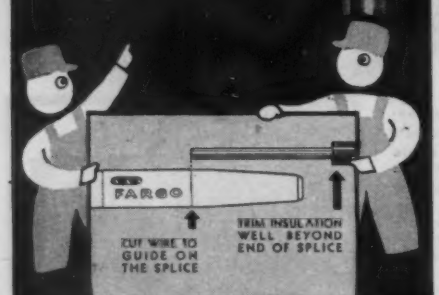
1 Four-Jaw gripping unit holds solid and stranded wires in permanent, slip-proof grip.

2 Safety Zone holds burred end wires safely clear of gripping jaws —no chance for slipping.

3 Side-wall Release admits a plain screw driver tip for easy release of conductors. No nails nor gadgets needed.

4 Sag Guide shows how much wire goes into the splice, tells you how much wire to cut off for the desired sag.

Use the FARGO LINE SPLICE, "the sure splice"



Made by FARGO MFG. CO.
Distributed by
LINE MATERIAL CO.
MILWAUKEE, WIS.

B. C. CUSTOMERS ASKED TO CURTAIL ELECTRIC USE

Electric customers of the B. C. Electric Railway Co. in Vancouver and vicinity were asked to curtail consumption on a voluntary basis in a message last month from President W. G. Murrin. Lack of precipitation during the winter and spring, coupled with a sharp increase in use, is responsible for a threatened power shortage.

Storage was reported down to 88,000,000 kwh. as opposed to the 188,000,000 kwh. normally in storage at the start of a year.

Steam generating plants have been supplying around 60,000,000 kwh. and an interconnection with Puget Sound Power & Light Co. near Sumas, Wash., has been completed.

In his statement, Murrin stressed the fact that increased consumption, nearly 45% of the prewar use, could have been handled readily under normal stream flow conditions.

Last serious power shortage in British Columbia occurred in 1929, when rigid rationing of electricity was established.

Stream Flow Continues Subnormal in West

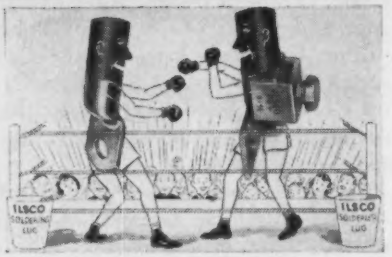
Stream flow conditions continued subnormal in the Pacific Northwest, central and southern California, southern Arizona and southern New Mexico, it was reported in the May Water Resources Review, although extreme water shortages were not anticipated during the summer, since storage and ground water levels were being maintained.

In eastern Oregon, Washington, southeastern Arizona and southeastern New Mexico, stream flow averaged about 50% of normal. A drought in the Gila Basin of southeastern Arizona continued through its eleventh month.

In northern and eastern Nevada, southern Utah, northern and western Arizona and southern California, stream flow was reported above normal.

● REA has made loan allotments in California and Washington totaling $360,000. The Foothill Electric Assn. Inc., Fresno received $260,000 for extensions and the Inland Empire Rural Electrification Inc., Spokane, $100,000 for connections and necessary improvements of existing lines.

ILSCO
Electrical Connectors



THEY'RE BOTH CHAMPS

Put your money on either one . . . ILSCO SOLDERING LUGS or ILSCO SOLDERLESS LUGS. You'll be in on the pay-off whatever you use in the ILSCO LINE . . . made from copper tubing right in our own plant . . . known for quality always.

Underwriters' and other approvals.

Please rush us sample and illustrated 32-page catalog
Name .....
Firm Name .....
Address .....

ILSCO COPPER TUBE & PRODUCTS, Inc.
CINCINNATI, OHIO

USE Mailway Banking

NIGHT OR DAY

Make deposits when you want to . . . right at the nearest mailbox. No need to "go to the bank." Nine out of ten transactions are routine that can be handled by our Mailway service, night or day, Sundays and holidays. Our special Mailway envelopes and passbook make service quick and safe.

Open a Mailway account by mail

CROCKER FIRST NATIONAL BANK
OF SAN FRANCISCO
California's Oldest National Bank

Member Federal Deposit Insurance Corporation
ONE MONTGOMERY STREET

WARTIME UTILITY RATES STUDIED IN CALIFORNIA

Right of utilities to charge war taxes to operating expenses is under discussion in California, where the state railroad commission recently launched a state-wide investigation of utility rates.

The state's 130 utilities have been ordered to submit by the end of July a record of 1943 earnings, operating expenses, taxes and net income. Hearings will be held at San Francisco and Los Angeles in August.

Charging that California's utilities are "in whole or in part" avoiding paying huge sums levied against them as excess profits by passing the cost on to their rate payers, the commission will judge whether or not the burden can be taken off customers by forcing rate reductions which would serve to eliminate excess profits.

Of the 130 utilities up for investigation, all grossing in excess of $250,000 a year, 13 are producing gas and electricity. Since the commission's power to adjust rates applies only in California, it has ordered the companies to segregate intrastate from interstate accountings.

The question arose in California in 1918, the commission ruling that Western States Gas & Electric Co. cease allowing war taxes as operating expenses. The same decision was handed Los Angeles Gas & Electric Corp. the following year.

Portland Utilities Declare Wartime Rate Dividends

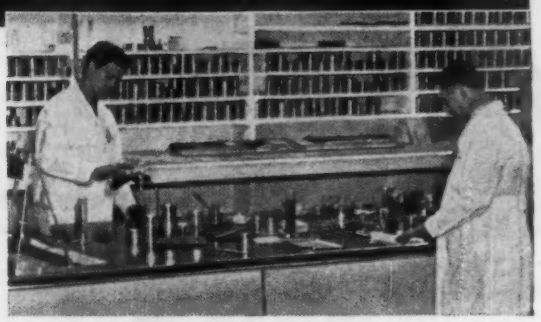
Rate dividends designed to compensate for unusual wartime earnings were distributed to customers of Northwestern Electric and Portland General Electric companies in June, when more than $1,100,000 was refunded by the two companies. Customers of Northwestern received $807,000 and PGE customers received $310,000 in cash refunds. Both figures were equal to an 86% discount on one month's bill.

The settlement was expected to end litigation in the PGE rate case.

● ANNUAL SAVING of $54,000 to public bodies purchasing power for resale will be realized by a new wholesale rate schedule which Puget Sound Power & Light Co. put into effect July 1. The new schedule, which is based on a five-year contract period, will bring rate reductions of the company this year to $750,000.

Higher Dielectric Strength—Longer Life
Can Be Built into Your Equipment

with Pedigree Electrical



INSULATING VARNISHES

Because of the accurate control of all production and strict adherence to carefully developed formulae, Pedigree varnishes are uniformly high in dielectric strength.

In addition, they provide resistance to oils, acids, alkali, and abrasion.

The P. D. GEORGE CO.
5200 North Second Street • St. Louis, Missouri

Call In the Pedigree Varnish Man Nearest You.

VICTOR INSULATORS INC
VICTOR, NEW YORK
Distributed by MAYDWELL & HARTZELL, Incorporated · SAN FRANCISCO · LOS ANGELES · SEATTLE

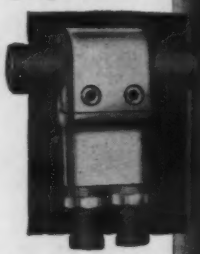
The Mark of Good Insulators . . .

"You have ALL Types of Tees to choose from—

—in the COMPLETE line"

All in one catalog, for your handy selection — *every* good type of tee connector... Each one carefully designed and tested, and manufactured under rigid engineering supervision.

Penn-Union Type HFM, with one-bolt or 2-bolt hinged clamp for the main. One or more branches can be connected afterward. Multi-slit tapered sleeve assures permanent grip on branch.



Penn-Union Hinged E-Z Tee takes a wide range of branch sizes. One-piece design makes installation easy. Tap connections can be made at any time.

Clamp Type Tees for all sizes of tubing and cable—a complete line. Machined contact surfaces.

Types for All Combinations —for connecting flat bar, run or tap, to tubing or cable. Also "general utility" tees that take a wide range of conductor sizes.

Penn-Union E-Z Tee is ideal for accommodating a large range of conductor sizes on both the main and branch. Will not loosen. 2, 3 or 4-post.

NORTHWESTERN AGENCIES
2411 First Ave., Seattle, Washington
Penn-Union Electric Corp., Erie, Pa.

F. M. NICHOLAS CO.
1123 Harrison St., San Francisco

KENNETH ANDERSON CO.
334 East 4th St., Los Angeles

PENN-UNION
Conductor Fittings

OFFICIAL RETURNS ON OREGON PUD BALLOT

Official election returns on annexation proposals by Central Lincoln PUD in coast sections of four Oregon counties (EWEST, June) were issued last month. Douglas County and the City of Toledo in Lincoln County rejected the proposal; other voting districts in Lincoln, Coos and Lane counties elected to join the PUD.

All areas involved in the election are at present served by the Lincoln PUD, which, with an area of about six square miles, has bonded itself to pay for the 120-mile system acquired from West Coast Power Co.

Toledo, which rejected the plan by a vote of 293 to 217, is said to use approximately one-fourth of the electricity sold by the PUD. The town assertedly is planning to establish a municipal system.

Douglas County, using one-fifth of the power served by the PUD, voted itself out by 192 to 79 in Reedsport and 119 to 72 in Gardiner and rural territory.

Waldport, in Lincoln County, voted 165 "yes" to 9 "no," while the combined rural vote was 568 to 100 in favor of the plan.

Coos County was for the plan, 143 to 20. Florence, in Lane County, accepted the proposal, 71 to 53, and rural areas involved were in favor, 370 to 70.

Colorado Report Contains Farm Electrification Data

Colorado's farms are well electrified, according to a report released June 1 by the Colorado State College extension service at Fort Collins, but a large rural electrification field remains to be developed.

Some 45% of the state's farms (23,000) enjoy electric service, the report states. Other information on this subject contained in the report: Federal loans from the Rural Electrification Administration have financed electric power for more than 15,000 rural consumers; and loans from REA to 18 farmer owned cooperatives and one small privately owned utility have totaled $6,722,950 in the nine years of REA's existence; repayments have amounted to $818,812.

● STILL UNDECIDED is the quarrel between cooperative Redlands Irrigation Co. in Mesa County and its seven employees who are ditch riders and operators of a small hydroelectric plant serving approximately 200 farms. The employees called a strike for June 14, under the Smith-Connally statute which calls for a 30-day cooling off period; were instructed by the War Labor Board to negotiate their long-standing dispute over wages and recognition of their union (International Brotherhood of Electrical Workers) as a collective bargaining agency; promptly protested the WLB directive through William Weiser, Grand Junction attorney. Government operation of the project was forecast by the WLB, if the strike threat is fulfilled.

High Court Decision Clears Way for PUD Bond Issue

Clearing the way for purchase of properties of the Mountain States Power Co., the Oregon State Supreme Court recently held that the Tillamook Peoples' Utility District's $750,000 bond issue, approved in 1940 by voters of the district, cannot again be placed on the ballot.

Acting in accordance with provisions of the measure approved by the voters, directors of the Tillamook PUD adopted an ordinance a year ago authorizing the issuance of the bonds. Their move was halted, however, when 18 taxpayers filed a referendum to permit the district voters to decide at the 1944 general election if they wanted the bond issue.

The Supreme Court decision held that the voters had already expressed their approval of the bond issue, and that issuance of the bonds was an administrative act, rather than a legislative one.

● LOS ANGELES Department of Water and Power completed its bond redemption and refunding program recently, when temporary certificates were exchanged for new revenue bonds in the amount of $15,000,000. The issue was sold last February as part of a program which will save the city $3,337,000. Electric plant refunding revenue bonds, issue of 1940, in the amount of $17,262,000 were recalled and revenue funds used to retire $2,262,000 of the issue. The balance was refunded at an interest rate of 1.775 instead of 2.7%.

● BY A VOTE of 55 to 37, plant employees of Sierra Pacific Power Co. elected to retain their affiliation with the Sierra Utility Workers Union rather than to join the AFL. The election was held after several workers had requested AFL membership. Office personnel and supervisory employees were not permitted to vote.

NO EXCUSES FOR UNNECESSARY OUTAGES

Service Interruptions Mean War Production Interruptions

● You can less afford unnecessary outages today than ever before. Man-power and time of servicing and replacing blown links make this prohibitive.

The elements of S & C Links are designed and constructed of silver, like the time-proven elements used in S & C Power Fuses. They *reduce unnecessary outages* and save time because they have:

- ★ **High surge capacity**
- ★ **Resistance to corrosion and deterioration**
- ★ **Uniform quality**
- ★ **Sustained accuracy of time-current characteristics**
- ★ **Greater mechanical strength**

S & C Universal Silver Fuse Links will save man-hours, truck-miles, and customer complaints. Can be used in all manufacturers' cutouts. Deliveries made from stock.

SCHWEITZER & CONRAD, INC.
4435 Ravenswood Avenue Chicago, Illinois
Manufactured in Canada by Powerlite Devices, Ltd., Toronto, Ontario

● Two vacancies in the Los Angeles Department of Public Utilities and Transportation — utilities regulation engineering associate and utilities regulation engineering assistant—will be filled by City Civil Service Commission examinations to be held soon. Salary for the assistant starts at $205 and the associate at $240 per month. A degree in engineering from a recognized college or university is required, and candidates for the associate level must have had three years of professional engineering experience, including two years of engineering or accounting in connection with operation or regulation of a utility. Applications may be secured from the Recruitment Section, Los Angeles City Civil Service Commission, Room 11, City Hall.

● Continuing Need for engineering draftsmen in various federal agencies was announced by the Civil Service Commission last month. There are approximately 300 vacancies in Washington, D.C. alone, it was stated, and positions for men only are open in Pearl Harbor. Salaries range from $1,752 to $3,163 a year, including overtime. Application forms may be secured at first- and second-class post offices, the commission's regional offices, or direct from Washington, D.C.

● Sale of San Francisco's 500-watt radio station KJBS to a syndicate of eight persons for $200,000, representing capital stock of Julius Brunton & Sons Co., was approved by the Federal Communications Commission. New owners who took over July 1 include Senator D. Worth Clark of Idaho; Mrs. Helen S. Mark, chief owner of WOL, Washington, D.C.; Edwin P. Franklin, general manager of KJBS, San Francisco; and Alice H. Lewis, wife of radio commentator Fulton Lewis. Sale was authorized since the Bruntons' own station KQW in San Jose, Calif., and the FCC prohibits multiple ownership in one locality.

● A $16,000,000 Program to convert its facilities from 50 to 60 cycles will be undertaken by Southern California Edison Co. as one of its postwar projects, it was announced recently. The changeover will eliminate necessity of special interchange facilities, now required for linking the company into the California network.

● Montana Power Co. was one of twelve winners of national awards in the Public Utilities Advertising Assn. "better copy contest." Results of the contest were announced at the group's annual meeting at Chicago in June.

PEOPLE

made this news

Nims Succeeds Bennion in Utah Power & Light Post

BENNION

Following resignation of Dr. Adam S. Bennion as assistant to the president of Utah Power & Light Co., L. W. Nims was appointed director of personnel and will take over many of Bennion's duties. Dr. Bennion is a candidate for United States senator on the Republican ticket.

Since 1940, Nims has been military liaison officer, assisting war establishments to utilize electrical facilities and directing protection of company properties against sabotage and other subversive activities. Previously he had served successively as power plant operator, division superintendent, traveling maintenance engineer, system power dispatcher and division manager at several points. Before joining the company he was with the Mexican Light & Power Co. for four years.

NIMS

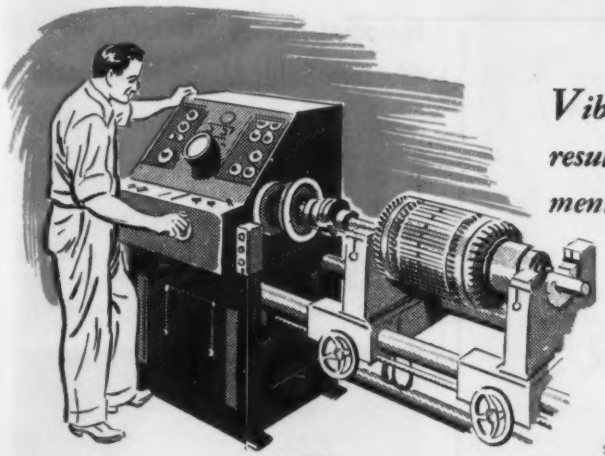
● Nelson C. Hazeltine, Portland, has been appointed director of information for the Bonneville Power Administration. He succeeds Henry Alderman, who left in March to join the staff of *Coronet* productions. For two years, Hazeltine had been associate editor of *The Timberman* and *Western Industry* magazines. Previously he spent 13 years in advertising and public relations work with New York Edison Co., Frank Presbrey Co. and Young & Rubicam, agency which handled TVA advertising.

● Howard Wright, Tacoma manager for Puget Sound Power & Light Co., returned recently from service in the Army. He was retired from active duty following 25 years in the Washington National Guard. In September 1940, he went into active service as regimental executive, regimental commander and groupment commander of Fort Worden, and in 1942 was transferred to Camp Wallace, Texas. During his last year there, he was commanding officer of the 7th Training Group Automatic Weapons.

● Harry W. Dalby, formerly senior engineer with the War Department Corps of Engineers, U. S. Army, of Denison, Texas, is now chief plant engineer of Consolidated Vultee Aircraft Corp. at Allentown, Penn. Before going with the Corps of Engineers at Denison, Dalby was electrical engineer for Consolidated Builders, Inc. at Grand Coulee Dam, and prior to that was associate engineer with the Corps of Engineers on the Bonneville project.

● S. S. Brundige has been appointed manager of the Portland office of General Electric Supply Corp., succeeding George A. Boring who had held the position for many years. Boring has been assigned to special work on utility accounts in the North Pacific district, to work with them on planning their future loads. Brundige has been with the company for eleven years and recently had held the position of sales manager in Portland.

● Richard B. Borland, for 14 years application engineer for Westinghouse Lamp division at Los Angeles, has been named manager of the division's Los Angeles office.



Vibration of rotating parts in high-speed apparatus results in undesirable noise and damage to equipment. Here's a cure pump manufacturers are using.

Curing the "Jitters"

ON HIGH-SPEED ROTATING PARTS

Pump runners, weighing from 30 to 1500 pounds, must be accurately tested to make sure they are in exact static and dynamic balance.

Westinghouse *Manufacturing and Repair** Plants, conveniently located in every district, have the special facilities needed for this job. By means of Dynetric Balancing equipment, the exact location and amount of unbalance is accurately determined. Then weight is applied or removed at proper points on the rotating piece to exactly neutralize the vibration effect.

This is typical of the specialized facilities offered by Westinghouse M & R Plants—a nationwide organization with local branches as close as your telephone. Factory-trained men, using factory methods and equipment, are ready to serve you promptly on any problem involving analysis or repair of electrical equipment.

J-90521

WESTINGHOUSE PRESENTS
. . . JOHN CHARLES THOMAS
SUN. 2:30 EWT., NBC.
"TOP OF THE EVENING"
MON. WED. FRI. 10:15 EWT., BLUE NET.

When vital electrical equipment needs repair . . . phone the nearest office of Westinghouse Electric and Manufacturing Company for

Westinghouse

COMPLETE REPAIR SERVICE

*33 M & R PLANTS • • ONE NEAR YOU

24-Hour Guard Duty

Against Unnecessary Shutdowns

TRICO REG. U.S. PAT. OFF.

KLIPLOKS

CLAMPS FOR FUSE CLIPS

Poor fuse clip contact creates excessive temperatures, causing fuse clips to lose their tension—fuses to become destroyed or blow prematurely, resulting in unnecessary costly shutdowns and production losses—repairs—wasted current, etc. TRICO KLIPLOKS stop this deplorable waste by locking fuse clips together, producing vise-like PRESSURE contact. Install them on new equipment before trouble starts—on old equipment to remedy trouble already existing. USE KLIPLOKS FREELY!

Write for Bulletin No. 6.

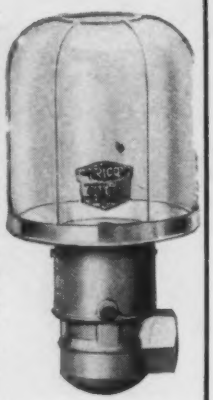
Knife Blade Type

Ferrule Type

OILERS

Lubricant, like manpower, is worthless unless it is at the right place at the right time. In lubricating, avoid "too much—too soon" as well as "too little—too late."

TRICO OILERS supply the needed protection by supplying the right amount at the right time AUTOMATICALLY. There's no guesswork—waste—unnecessary stoppages for oiling and repairs. Oil supply is always visible. There's a style for every application. Write for Catalog.



COAST REPRESENTATIVES

W. E. Young Co., 1944 Broadway, Denver
H. H. Van Luven, 307 E. 3rd St., Los Angeles
Albert S. Knight, 3006 Western Ave., Seattle
Wallace R. Lynn Co., 2048 Market St., San Francisc

TRICO FUSE MFG. CO. Milwaukee, Wis.

MAKE WIRE JOINTS

The Modern Way

IDEAL Wire-Nuts

Solderless, Tapeless Wire Connectors

UNRESTRICTED

Conserve Critical Materials—Ideal "Wire-Nuts" use no Tin or Rubber. Meet all Government Requirements and are approved as alternate for solder-and-tape joints. Approved by Underwriters Laboratories, Inc. Sizes for every job. FREE SAMPLES.

PROMPT DELIVERY
Sales offices in all principal cities

IDEAL Sycamore
IDEAL COMMUTATOR DRESSER CO.

WEST COAST WAREHOUSE STOCKS:
Stribby & Barton, Ltd., 912½ E. 3rd St., Los Angeles, Cal.
F. M. Nicholas Co., 1123 Harrison St., San Francisco, Cal.
L. S. Foley, 181 S.W. 4th Ave., Portland, Oregon
Robinson Sales Co., 3215 Western Ave., Seattle, Wash.

H. H. Van Luven

307 East 3rd St. Los Angeles (13)
MUtual 5173

Manufacturers' Representative

S. H. COUCH CO.
Telephone Equipment—Annunciators—Push Buttons—Blake Staples

LENZ ELECTRIC MFG. CO.
Lead—Braid Covered Cables and Wires Tinsel and Copper Cordage

SIGNAL ENGINEERING & MFG. CO.
Relays—Bells—Horns—Code Call Systems Fire Alarm Systems

HART MANUFACTURING COMPANY
Remote Control Equipment—Relays—Thermostats

STERLING SIREN CO.
Electric Sirens

THE PAINE COMPANY
Toggle Bolts—Expansion Anchors

CANNON ELECTRIC—DEVELOPMENT CO.
Hospital Signal Systems Motor Plugs—Receptacles

TRICO FUSE MFG. CO.
Fuses, Oilers, Clip Locks and Fuse Pullers

KNOX PORCELAIN CORP.
Electrical Porcelain

Hotpoint Names Schafer Western Sales Manager

Edison General Electric Appliance Co. has appointed Ward R. Schafer Western regional sales manager, with headquarters in San Francisco. He will have charge of the Salt Lake City, Los Angeles and Seattle districts.

Schafer joined Hotpoint in 1924 in the commercial cooking sales division. Later he was manager of the product service division and of the range sales division. Following Pearl Harbor, he joined the George A. Fuller Co. as superintendent of construction on the butadiene plant near Houston, Texas. He comes to his new position following completion of that project.

SCHAFER

● ROY A. WEHE, former gas and electrical engineer for the California Railroad Commission, has been appointed assistant director of public utilities for the commission, it was announced recently. Wehe's duties will include planning and conducting major formal and informal rate investigations of gas, electric, telephone, telegraph and water companies. Prior to joining the commission in 1923, Wehe was employed on hydroelectric projects of the Southern California Edison Co.

● LYLE SMITH, agricultural engineer for Southern California Edison Co. at Visalia, recently joined the Pacific Gas and Electric Co. and is in the North Bay Division at San Rafael.

● A. DARLINGTON, Northern Electric Co. Ltd., Vancouver, B.C., has been elected president of the National Office Management Assn., recently formed there.

Lincoln Electric Tells Personnel Changes

G. L. Revell has been named Portland district manager by the Lincoln Electric Co., manufacturer of arc welding equipment. He succeeds E. H. Weil, who is a lieutenant in the Navy. Previously Revell had been with Lincoln as welding engineer at Los Angeles and San Francisco.

Also announced by Lincoln Electric recently was transfer to Portland from Salt Lake City of J. W. Donnelly, welding engineer.

● APPOINTMENT OF LOIS FERRIS as Pacific Coast district home economist was announced recently by Westinghouse Electric & Mfg. Co. She has been home economist for the company at Mansfield, Ohio. Miss Ferris succeeds Mrs. Betty Lake Jordan, resigned. At Mansfield, she devoted much of her time to postwar development and research on equipment and on synthetic fabrics.

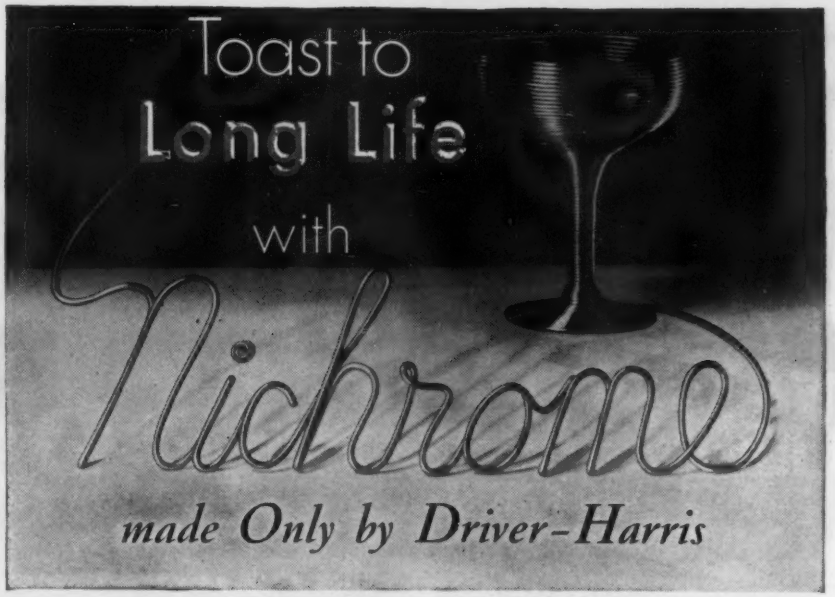
● VINCENT G. SHINKLE, secretary-treasurer of the Washington Water Power Co. from 1918 until his retirement in 1928, died in Pasadena. Mr. Shinkle joined the Washington utility in 1907 and was well known throughout the Northwest and in the East on account of his activity in the company's early financing.

● DR. L. H. FULLER has been appointed assistant chief engineer of the Joshua Hendy Iron Works at Sunnyvale, Calif. Former head of the University of California school of electrical engineering, Fuller has served as consulting engineer for Hendy for more than a year.

● DEE BREEN has been appointed Western division sales manager by Littelfuse, Inc., with headquarters at El Monte, Calif. Before the war he was with Chrysler Corp. and more recently he has been in Washington, D. C., serving as expediter of materials for the Signal Corps.

● EVERETT A. HAMILTON became operating superintendent for Montana Power Co. on June 1. He formerly was in charge of the company's substations. Hamilton has been with Montana Power and its predecessors since 1910.

● C. P. DENNY was appointed to the Imperial Irrigation District (Calif.) board of directors to succeed the late Mark Rose.



Electrical resistance and heating elements wound with Nichrome* live a longer life of satisfactory service because of perfected heat and corrosion resistance properties.

This exclusive Driver-Harris nickel-chromium product enjoys an enviable record with leading manufacturers of electrical equipment throughout the world.

Nichrome*...is a toast to longer life and improved performance in your post-war products, so specify it and other D-H resistance alloys when buying resistors and heating elements.

*Trade Mark Reg. U. S. Pat. Office

D/H SPECIAL PURPOSE ALLOYS SINCE 1909

Driver-Harris COMPANY

Stocked for the Coast Trade at ANGUS-CAMPBELL, INC.

235-241 San Bruno Ave., San Francisco • 449 So. San Pedro St., Los Angeles • 2122-4th Ave., Seattle

Main Office and Plant: HARRISON, NEW JERSEY

Use More DROP FORGED Pole Line Hardware And Obtain ★

1 Plus Strength in Lighter Sectional Thicknesses.

2 Uniform Physical Structure, Size and Shape.

3 Freedom from Concealed Defects.

4 Extra Margin of Safety.

Forgings offer many direct and indirect economies. Consult makers of drop forged pole line hardware.

DROP FORGING ASSOCIATION

605 HANNA BUILDING • CLEVELAND, OHIO

Blackburn "Gripits" cost about half as much as split bolt connectors, and do the same job at the house service entrance. Save by using them! "Gripits" are made of a high-strength copper alloy — actually stronger than steel. Circular construction gives extra strength. "Gripits" will not stretch or distort when tightened — will not come loose.

Hundreds of thousands in use throughout the world

Over 75 Conveniently-located Jobbers' Stocks

JASPER BLACKBURN PRODUCTS CORP.
Main and Clinton Sts. • ST. LOUIS (6), MO.
Builders of Quality Connectors for Over 10 Years

Appointment of Robert R. Gros as manager of the publicity and advertising department was announced last month by Pacific Gas and Electric Co. A member of the department for seven years, he had been acting department manager since the death of Al C. Joy. Previously he had been field representative in press relations and had been a speaker before many civic groups and other public meetings

Graybar Makes Changes In West Coast Staff

S. W. Scott has been named Graybar commercial manager, Los Angeles district, to succeed W. E. Guy. Guy was transferred to Chicago as district commercial manager. Scott joined Graybar in 1928 as supply salesman at Los Angeles. He became manager of the small appliance department in 1935 and in 1937 was appointed merchandising department manager. He also was hearing aid specialist.

D. H. Capelli succeeds Scott as merchandising manager at Los Angeles. Capelli went with Graybar in 1934 as merchandising manager at San Francisco. In 1940, he was made Salt Lake City merchandising manager and, in October 1942, assumed the additional duties of credit manager.

J. J. Martineau, procurement advisor for Graybar at Salt Lake City since 1942, will take over the post of merchandising manager there.

● L. M. SMITH, formerly of Orlando, Fla., with Graybar Electric Co., has been transferred to Salt Lake City to take the place of E. I. Funk, who recently left the company to go into business for himself, according to Roy Kimberlin, Salt Lake manager.

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA

GEO. E. HONN CO.
420 Market St. San Francisco, Calif.
Sutter 7565

Manufacturers' Representative for:

American Cross-Arm, Inc.
Cross-Arms, Hardwood Pins and Moulding

Bartlett Mfg. Co.
Tree Trimming Equipment

Burndy Engineering Co.
Connectors and Lugs—All Types

Columbia Electric Mfg. Co.
Crompton Tong Test Ammeters

Cornell-Dubilier Electric Corp.
Capacitors for Power Factor Correction

T. J. Cope, Inc.
Underground Tools & Equipment

Herman D. Steel
Meter Jewels

Kellems Co.
Cable Grips for Pulling and Permanent Support.

Minerallac Electric Co.
Insulating Compound, Clips, Hangers and Statiscopes

Schweitzer & Conrad
Fuses and Protective Devices

Specialty Device
Cone Anchors, Guy Guards and Earth Augers

The States Company
Test Blocks and Meter Testing Equipment

R. Thomas & Sons Co.
Pin-type and Suspension Insulators

Electroline
Wire Rope Fittings

● O. FRED NATS, for more than 19 years Rocky Mountain and Pacific Northwest representative for the American Electrical Heater Co. of Detroit, has joined the Corps of Engineers as post electrical engineer at Fort Logan, Colo. Nats became associated with the War Department in the spring of 1942 and has been engaged in construction of Buckley Field, Colo., Tooele Ordnance Depot, Utah and several housing projects in Wyoming and Nebraska. Before going with American Electrical Heater Co. in 1922, Nats served on construction of the Central Colorado Power Co. hydroelectric plants and transmission lines for the Northern Colorado Power Co. He also was district manager for the Fort Lupton Light & Power Co. and the Arapahoe Electric Light & Power Co.

● KEN M. PATTISON has been appointed manager of the Vancouver, B. C. branch of Cochrane, Stephenson Co. Ltd., wholesale electrical equipment dealers, according to announcement by L. M. Cochrane, president. He succeeds the late W. C. McKendry.

● H. M. BATEMAN and MRS. ESTELLE M. AALBERG have been elected vice-presidents of Peerless Electrical Products Co., San Francisco, it was announced recently. Eugene M. Keillor has been named design department head.

OBITUARY

Colonel George Hunt

Colonel George A. Hunt, U. S. Army Reserve officer and Pacific Gas and Electric Co. engineer, died June 12 in Oakland, Calif., following an illness of several months.

Born in Oakland in 1888, Colonel Hunt received an engineering degree from the University of California in 1911, and joined PG and E as assistant valuation engineer in 1914. He left the same year to become construction engineer for the Sierra and San Francisco Power Co.

During World War I, he served in France first as captain in the engineer corps and later as lieutenant colonel. In 1921, he was transferred to the army reserve and made a full colonel. He organized and commanded the 302nd Chemical Warfare regiment, an Army Reserve unit, with headquarters in San Francisco.

● ANDREW HOUSTOUN, 73, president of the wholesale and retail hardware, furniture, and electrical firm of McLennan, McFeely & Prior Ltd., with headquarters in Vancouver and branches all over B. C., died suddenly at Vancouver recently. Mr. Houstoun was born in Scotland and came to Vancouver more than 50 years ago. He became president of Mc & Mc in 1928, and prior to that was secretary-treasurer.

● OLIVER J. SCHIEBER, 55, for 30 years a civil engineer for the Southern California Edison Co., died June 23 in Los Angeles. Mr. Schieber also served as division superintendent of the Metropolitan Water District for seven years.

WESTERN REPRESENTATIVES
FRED W. CARLSON, Seattle
J. G. CORRIN, Los Angeles
R. F. HAMILTON, Denver
METER SERVICE CO., Salt Lake City

SWITCHES, ENCLOSURES, ACCESSORIES
METER DEVICES COMPANY CANTON, O.

Vulcoid is adaptable

Here is a proud achievement of Continental-Diamond Research that combines the properties of laminated phenolic plastics and vulcanized fibre. That is why Vulcoid is such an excellent all-around product. No matter how you want to fabricate your insulation, **Vulcoid is adaptable.**

Carrying the Underwriters' Laboratories approval, Vulcoid has many applications in which it excels either phenolic laminated or fibre. Typical uses of Vulcoid are:

Motor Lead Bushings
Circuit Breaker Barriers
Transformer Barriers
Transformer Lead Bushings
Knife Switch Guides
Transformer Coil Separators
Bobbin Heads
Trolley Wire Insulators
Instrument Panels
Contact Panels

Marwood invites your inquiry on Vulcoid and other C-D Non-Metallic materials.

MARWOOD LIMITED

SEATTLE . PORTLAND . SAN FRANCISCO . LOS ANGELES

902

RELIABLE Connectors

Save Time

by using solderless connectors with accurately fitting precision threads which insure easy, permanent installations.

Save Copper

by using these connectors which are good as new after being salvaged.

EASY TO INSTALL
LOW IN COST

Reliable
ELECTRIC COMPANY
OVER 35 YEARS SERVICE TO THE UTILITIES

Special service awards were received by Alston R. Zryd and John A. Gilmont, USBR assistant engineers at Sacramento, for an idea submitted in the bureau's employee suggestion system. The suggestion was an improved process for map coloring. Shown above, left to right: R. S. Calland, assistant regional director, USBR, Zyrd, Gilmont and Charles E. Carey, USBR regional director

TRADE *notes*

● NATIONAL CARBON Co. has announced a new sales set-up, under which company products will be handled from seven division offices. On the West Coast, R. P. Tolles, manager of the former Pacific Coast division, will be director of the new San Francisco organization. Assistants will be A. R. Miller, former Portland manager, and O. B. Rendahl. From headquarters at 114 Sansome St., San Francisco, the division staff will handle sales in California, Washington, Oregon, Western Montana, Idaho, Utah, Arizona and Nevada.

● AMERICAN ELECTRIC CONSTRUCTION Co., of San Francisco, George A. Meyer, president, has enlarged its facilities to about eight times prewar capacity in moving to a new building at 955 Howard St. The firm has been engaged in a number of the large war plant and military facilities contracts throughout the West.

● ED H. BRUMFIELD, formerly associated with his brother, William Brumfield, in the Brumfield Electric Sign Co., has joined the Atlas Pacific Neon Co. at 433 Eleventh St., San Francisco. The original Brumfield Sign Co. closed when the dimout came and has been converted to other war work.

● RAYMOND ACKERMAN has been appointed Utah representative for Porcelain Products Inc. of Findlay, Ohio. With headquarters in Salt Lake City, Ackerman will also cover parts of Nevada and Wyoming. The company handles a line of electrical porcelain.

● FORST'S Ltd., has moved its store from West Broadway, Vancover, B. C., to new premises at 1076 Granville St. The building will be used for the display of furniture, bedding and electrical appliances. The branch is under the management of Vince McBride.

● G. W. SHARPE Sr. and J. W. SHARPE Jr. have registered partnership in the business of Sharpe's Electric Service at 2539 E. Hastings St., Vancouver, B. C.

● WALTER'S ELECTRIC SERVICE, Abbotsford, B. C., has moved to new quarters in the News Bldg., Essendene Ave.

● CLARENCE NELSON has now moved his hardware and electrical business to new premises at Abbotsford, B.C.

TORK CLOCKS

THE POPULAR TIME SWITCH LINE KNOWN EVERYWHERE

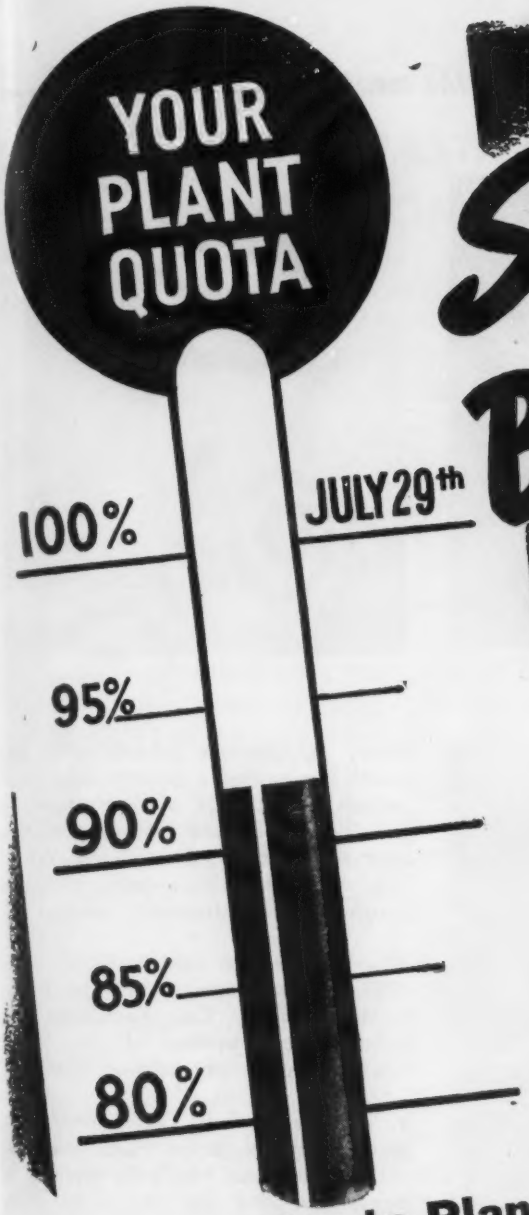
There is a Tork Clock for every regular switching job: 60 minute, 4 hour or daily cycles.

Bulletins on request

THE TORK CLOCK CO., Inc.
MOUNT VERNON, N. Y.

Western Representatives:

A. R. Slimmon, 445 E. 3rd St.....Los Angeles
Geo. H. Curtiss, 540 McAllister St., S. F.
H. M. Sayers, 1101 Eastlake Ave.....Seattle
Stevens Sales Co., 41 P.O. Place, Salt Lake City
Felix Simon, P.O. Box 614.....Denver
H. Geo. Sheffer, P.O. Box 1587.....Phoenix



Stay at Your Battle Stations!

MANAGEMENT • LABOR

—the 5th War Loan Drive is still on.

July 29th is the last pay day in the Drive.

The U. S. Treasury has set the overall goal at $16,000,000,000 —$6,000,000,000 from individuals alone. This is the biggest sum ever asked of the American people—*and it must be raised!*

Keep fighting. The 5th War Loan is a crucial home front battle of tremendous importance to the total war effort.

Tighten up your 5th War Loan Drive organization. Step up your solicitation tempo. Drive! Drive!! Drive!!! Hit your Plant Quota's 100% mark with a bang that'll proclaim to all the world that the U. S. Home Front is solidly in back of the Fighting Front.

Need help? Need ideas? Call on the Chairman of your War Finance Committee. He's standing by.

Here's the Quota Plan:

1. Plant quotas are to be established on the basis of an *average* $100 *cash* (not maturity value) purchase per employee.
2. Regular Payroll Savings deductions made during the drive accounting period will be credited toward the plant quota.
3. Employees are expected to contribute toward raising the cash quota by buying extra 5th War Loan Bonds: 1—Outright by cash. 2—By extra installment deductions. 3—By extra installment deductions plus cash.

Example: JOHN DOE MFG. CO.—1,000 Employees

1,000 Employees × $100 . . . $100,000 Cash Quota

Regular payroll deductions during the eight weekly payroll accounting periods of June and July. 30,000

$70,000 (to be raised by sales of extra Bonds).

BACK THE ATTACK—SELL MORE THAN BEFORE

The Treasury Department acknowledges with appreciation the publication of this message by

ELECTRICAL WEST

★ ★ *This is an official U. S. Treasury advertisement—prepared under the auspices of Treasury Department and War Advertising Council.* ★ ★

Index to Advertisers
JULY, 1944

Allis Chalmers Mfg. Co. 4, 5
Aluminum Co. of America 17
Anaconda Wire & Cable Co. 79

Bethlehem Steel Co. 38
Blackburn Products Co., Jasper 98
Briegel Method Tool Co. 89
Bull Dog Electric Products Co. 11
Burndy Engineering Co., Inc. 16

Chance Co., A. B. 40
Crocker First National Bank 90

Driver-Harris Co. 97
Drop Forging Assn. 97

Electromaster, Inc. 44

Federal Electric Products Co. 39
Four Wheel Drive Auto Co. 83

General Electric Co.:
Bridgeport 12, 13
Schenectady 1, 24
George Co., P. D. 91

Helwig Co. 88
Hendy Iron Works, Joshua 25
Honn Co., Geo. E. 98
Hub Electric 89

Ideal Commutator Dresser Co. 96
Ilsco Copper Tube & Products Co. 90
Indiana Steel & Wire Co. 98
I-T-E Circuit Breaker Co. 27

Jeffries Transformer Co. 88
Johns-Manville Corp. 31

Kearney Corp., James R. 89
Klein & Sons, Mathias 33
Kyle Corp. 29

Landers, Frary & Clark 23
Line Material Co. 90
Lloyd Products Co. 18

Marwood, Limited 99
Matthews Corp., W. N. 20
Meter Devices 99
Meyberg Co., Leo J. 10
Miller Co., The 26
Mitchell Mfg. Co. 15

Okonite Company, The 22
Okonite-Callender Cable Co., Inc. 22

Pacific Coast Elec'l Assn. ..... 4th Cover
Pacific Gas and Electric Co. ..... 3rd Cover
Penn-Union Elec. Corp. 92

Reliable Electric Co. 100
Roebling's Sons Co., John A. 37

Sangamo Electric Co. 3
Schweitzer & Conrad 93
Sheldon Service 84
Shell Oil Co. 7
Simplex Wire & Cable Co. 30
Smoot-Holman Co. 36
Southern California Edison Co. Ltd. ..... 2nd Cover
Spang-Chalfant Division, The National Supply Co. 43
Square D Co. 81
Sylvania Elec. Prod., Inc. 8, 9

Thomas & Betts Co., Inc. 14
Tork Clock Co. 100
Treasury Department 101
Trico Fuse Mfg. Co. 96

Union Oil Company 21
U. S. Rubber Co. 41

Van Luven Co., H. H. 96
Victor Insulators, Inc. 91

Westinghouse Electric & Mfg. Co.:
East Pittsburgh 6, 19, 32, 85, 95
Westinghouse Lamp Division:
Bloomfield 34, 35
Wiegand Co., Edw. L. 88
Wiremold Company, The 28

PROFILES *of the month*

Emery D. Sherwin (above left) last month was named a director and vice-president in charge of operations by San Diego Gas and Electric Co. Except for Army service during World War I, he has been with the San Diego utility continuously since 1915

Albert E. Grauer (above right) since 1939, general secretary of the B. C. Electric Railway Co., has been appointed vice-president of the B. C. Power Corp., utility holding company

V. W. Marquis (left) OWU and WPB, pictured at the recent PCEA meeting in Los Angeles. He is in charge of power supplies for the Far West

Germicidal lamps for use in reducing bacterial contamination of the 1944 asparagus pack arrive at Los Angeles, enroute to Yakima, Wash. On hand at the Los Angeles airport to look them over are, from left: J. D. Gladstone, Milton Greenwald, Tru-Aire Ultraviolet Products Co. and L. H. Hruby, G-E Co.

In cooperation with

Central Valley Project

POWER FROM SHASTA DAM FLOWS OVER P. G. and E. LINES TO HOMES, FARMS and FACTORIES

Central Valley Power today flows into the homes, farms and factories of Northern and Central California—through the interconnected transmission and distribution system of Pacific Gas and Electric Company.

Under contract with the Federal Bureau of Reclamation, Central Valley Power is delivered to the Company at its Shasta Substation, twenty-five miles below Shasta Dam —is metered and paid for there. From that point the Company's system becomes the natural and most economic outlet for Central Valley Power, making it possible to put that power to immediate productive use.

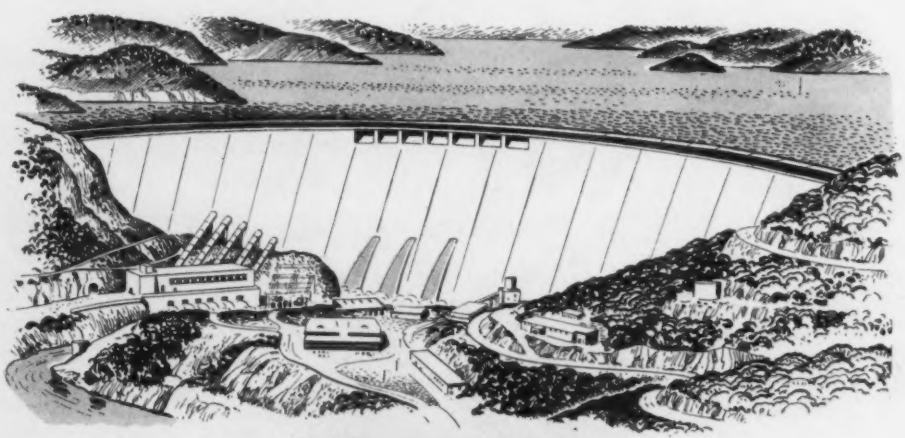
We have undertaken to pay the Government a minimum of $2,700,000 a year for the output from Shasta Dam beginning January 1, 1945. Payments may exceed $3,000,000 a year—millions which the Government may apply to operating costs and to reducing the cost of water to the farmers of the Sacramento and San Joaquin Valleys.

Distribution of Central Valley Power over the Company's system follows a program submitted to the Government more than three years ago. Construction of new plants has been curtailed by us; contracts for purchased power have been re-arranged; the output of our steam operated plants has been reduced—all to make a place for Central Valley Power.

We are cooperating with the Government as we have cooperated over the years with cities, irrigation districts and other governmental agencies—cooperating to provide a market for electric power developed as an incident to water conservation and storage.

When additional Central Power is developed the Company will be ready to make a market for that too and to pay for it the same fair and equitable price we are paying for the power now delivered to us at Shasta Substation.

Central Valley Power is brought to the people of Northern and Central California at the same low rates they now pay—rates that are among the lowest in the United States. It joins with the output of Pacific Gas and Electric Company's sixty-five generating plants to meet the electric needs of homes, farms and factories—to serve the country in war—and when peace comes to help build a greater California.



P·G·and E·
PACIFIC GAS AND ELECTRIC COMPANY

Including adequate wiring in the plans is the modern home-builder's best assurance that future living comforts and electrical conveniences are provided for in his new home. The properly wired house is equipped to make full use of every electrical appliance and service, including new electrical products and uses which will be available after the war. This means that the adequately wired home can be kept modern long after it is built . . . its sale value is increased. Is *your* knowledge of home wiring up-to-date?

PACIFIC COAST ELECTRICAL ASSOCIATION

601 W. FIFTH STREET, LOS ANGELES 13, CALIF. • 447 SUTTER STREET, SAN FRANCISCO 8, CALIF.